

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

CHAS. HUDE A/S
H.C. Andersens Boulevard 33
DK-1553 Copenhagen V
DANEMARK

Date of mailing (day/month/year) 16 November 2001 (16.11.01)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 72201 UCK/Ve	
International application No. PCT/DK00/00252	International filing date (day/month/year) 12 May 2000 (12.05.00)

1. The following indications appeared on record concerning:

☒ the applicant ☐ the inventor ☐ the agent ☐ the common representative

Name and Address

HERCULES INCORPORATED
Hercules Plaza
1313 North Market Street
Wilmington, DE 19894
United States of America

State of Nationality

US

State of Residence

US

Telephone No.

Facsimile No.

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☒ the person ☐ the name ☐ the address ☐ the nationality ☐ the residence

Name and Address

CP KELCO APS
Ved Banen 16
DK-4623 Lille Skensved
Denmark

State of Nationality

DK

State of Residence

DK

Telephone No.

Facsimile No.

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒ the receiving Office ☐ the designated Offices concerned
☐ the International Searching Authority ☒ the elected Offices concerned
☒ the International Preliminary Examining Authority ☐ other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

Marie-José DEVILLARD

Facsimile No.: (41-22) 740.14.35

Telephone No.: (41-22) 338.83.38

orm PCT/IB/306 (March 1994)

004462305

PATENT COOPERATION TREATY

PCT/DK00/00252

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
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in its capacity as elected Office

Date of mailing (day/month/year)

12 January 2001 (12.01.01)

International application No.

PCT/DK00/00252

Applicant's or agent's file reference

72201 UCK/Ve

International filing date (day/month/year)

12 May 2000 (12.05.00)

Priority date (day/month/year)

12 May 1999 (12.05.99)

Applicant

JØNSSON, Torben et al

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

27 November 2000 (27.11.00)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was



was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

R. E. Stoffel

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09/926475

PCT**REQUEST**

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference
(if desired) (12 characters maximum) 72201 UCK/ve

Box No. I TITLE OF INVENTION Food Composition with High Solids Content, A Method for Its Preparation as well as the Use of Carra-geenans for Gelling a Food Composition

Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

Hercules Incorporated
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Wilmington, Delaware 19894
USA

☐ This person is also inventor.

Telephone No.

001 302 594 6923

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001 302 594 6998

Teleprinter No.

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State (that is, country) of nationality:
US

State (that is, country) of residence:
US

This person is applicant
for the purposes of:

☐ all designated
States

☒ all designated States except
the United States of America

☐ the United States
of America only

☐ the States indicated in
the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

JØNSSON, Torben
17, Fortunvej
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This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (If this check-box
is marked, do not fill in below.)

State (that is, country) of nationality:
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State (that is, country) of residence:
Denmark

This person is applicant
for the purposes of:

☐ all designated
States

☐ all designated States except
the United States of America

☒ the United States
of America only

☐ the States indicated in
the Supplemental Box

☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf
of the applicant(s) before the competent International Authorities as:

☒ agent

☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

CHAS. HUDE A/S
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DENMARK

Telephone No.

+ 45 33 15 45 14

Facsimile No.

+ 45 33 15 45 35

Teleprinter No.

--

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

If none of the following sub-boxes is used, this sheet should not be included in the request.

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

KRISTENSEN, Jeanette
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DENMARK

This person is:

- ☐ applicant only
☒ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:
Denmark

State (that is, country) of residence:
Denmark

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

GRØNDAL, Jan
7, Meteorvej
DK-4040 Jyllinge
DENMARK

This person is:

- ☐ applicant only
☒ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:
Denmark

State (that is, country) of residence:
Denmark

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only
☐ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only
☐ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on another continuation sheet.

See Notes to the request form

Box No. V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

Regional Patent

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- ☒ **EA Eurasian Patent:** AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP European Patent:** AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ **OA OAPI Patent:** BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- | | |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
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| <input checked="" type="checkbox"/> AL Albania | <input checked="" type="checkbox"/> LS Lesotho |
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| <input checked="" type="checkbox"/> FI Finland | <input checked="" type="checkbox"/> SK Slovakia |
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| <input checked="" type="checkbox"/> GE Georgia | <input checked="" type="checkbox"/> TM Turkmenistan |
| <input checked="" type="checkbox"/> GH Ghana | <input checked="" type="checkbox"/> TR Turkey |
| <input checked="" type="checkbox"/> GM Gambia | <input checked="" type="checkbox"/> TT Trinidad and Tobago |
| <input checked="" type="checkbox"/> HR Croatia | <input checked="" type="checkbox"/> TZ United Republic of Tanzania |
| <input checked="" type="checkbox"/> HU Hungary | <input checked="" type="checkbox"/> UA Ukraine |
| <input checked="" type="checkbox"/> ID Indonesia | <input checked="" type="checkbox"/> UG Uganda |
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| <input checked="" type="checkbox"/> KG Kyrgyzstan | <input checked="" type="checkbox"/> ZW Zimbabwe |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea | |
| <input checked="" type="checkbox"/> KR Republic of Korea | |
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| <input checked="" type="checkbox"/> LC Saint Lucia | |
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Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet:

☒ **AG** = Antigua and Barbuda

☐

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Box No. VI PRIORITY CLAIM					<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:			
		national application: country	regional application: regional Office	international application: receiving Office	
item (1) (12.05.1999) 12 May 1999	PA 1999 00650	Denmark			
item (2)					
item (3)					
<input type="checkbox"/> The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s):					
<small>* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.</small>					
Box No. VII INTERNATIONAL SEARCHING AUTHORITY					
Choice of International Searching Authority (ISA) <small>(if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):</small>		Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):			
ISA / EP		Date (day/month/year)	Number	Country (or regional Office)	
Box No. VIII CHECK LIST; LANGUAGE OF FILING					
This international application contains the following number of sheets: request : 4 description (excluding sequence listing part) : 40 claims : 4 abstract : 1 drawings : 10 sequence listing part of description : _____ Total number of sheets : 59		This international application is accompanied by the item(s) marked below: 1. <input checked="" type="checkbox"/> fee calculation sheet 2. <input type="checkbox"/> separate signed power of attorney 3. <input type="checkbox"/> copy of general power of attorney, reference number, if any: 4. <input type="checkbox"/> statement explaining lack of signature 5. <input checked="" type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 1 6. <input checked="" type="checkbox"/> translation of international application into (language): English 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input checked="" type="checkbox"/> other (specify): Copy of Off. Action received in PA 1999 00650			
Figure of the drawings which should accompany the abstract: 1.1		Language of filing of the international application: English			
Box No. IX SIGNATURE OF APPLICANT OR AGENT					
<small>Next to each signature, indicate the name of the person signing and the capacity in which the person signs (such capacity is not obvious from reading the request).</small>					
HERCULES INCORPORATED <u>Mark D. Kuller</u> Mark D Kuller, Chief Counsel		<u>Torben Jönsson</u> <u>Jeanette Kristensen</u> <u>Jan Grøndal</u>			
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1. Date of actual receipt of the purported international application: 3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application: 4. Date of timely receipt of the required corrections under PCT Article 11(2): 5. International Searching Authority (if two or more are competent): ISA /		2. Drawings: <input type="checkbox"/> received: <input type="checkbox"/> not received: 6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.			
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Title

Food Composition with High Solids Content, A Method for Its Preparation as well as the Use of Carrageenans for Gelling a Food Composition

Technical Field

- 5 This invention relates to a food composition having high solids content, a method for its preparation as well as the use of carrageenans for gelling a food composition. More particularly, this invention relates to confectionery products such as e.g. soft candies comprising as gelling agent one or more carrageenans, a method for the preparation thereof as well as the use of carrageenans for gelling a food composition.

10

Background Art

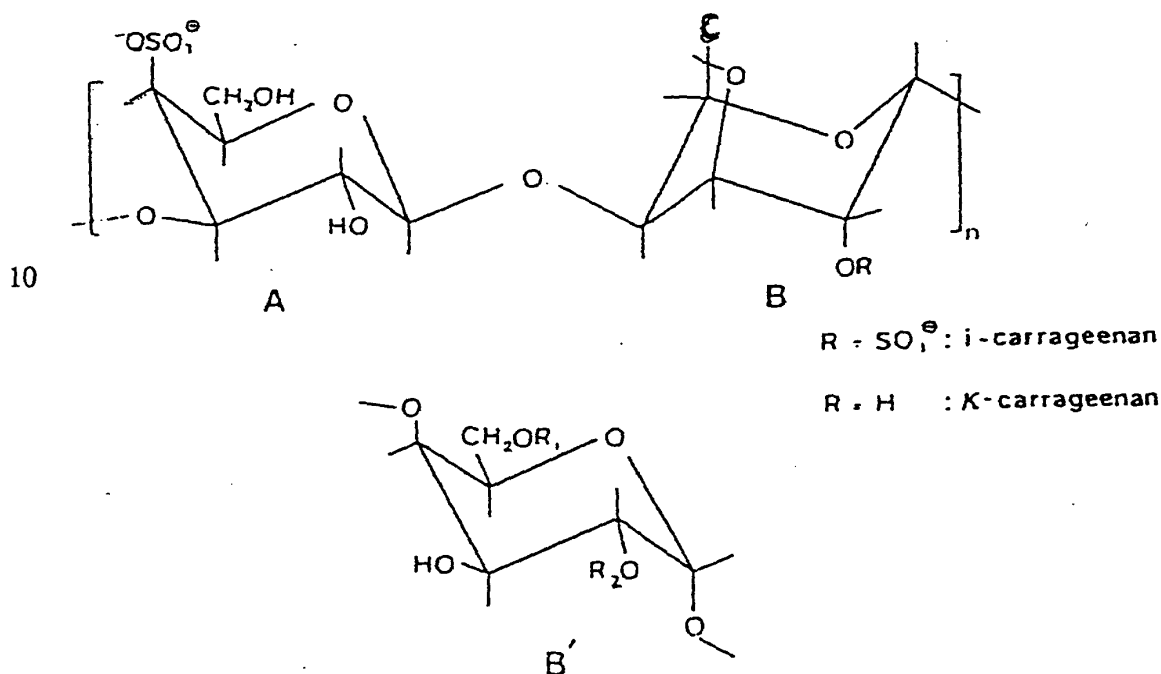
- Food compositions having high solids content, such as confectionery products, e.g. soft candies or wine gum, are conventionally gelled by the use of gelatine, a heterogenous mixture of water-soluble high molecular weight proteins. Gelatine is
15 derived from collagen, usually by boiling animal hides or bones.

- Despite its excellent gelling capability, gelatine suffers from a number of drawbacks which can be attributed to its animal origin. Thus, gelatine is unacceptable to those of Muslim and Jewish faith, as it is often prepared from swine skin. Further, recently the use of gelatine in foods has been questioned due to the possible link between
20 consumption of foods containing gelatine of bovine origin and the occurrence of the Creutzfeldt-Jakob disease. Finally, the consumption of animals and animal-derived foods may be objectionable for some from an ethical point of view.

There is therefore a need for a vegetable alternative to gelatine.

One such alternative is carrageenan. Carrageenans extracted from seaweed are known to be useful as thickening, viscosifying and gelling agents. Carrageenans are polysaccharides consisting of alternating copolymers of $\beta(1\rightarrow3)$ -D-galactose and $\alpha(1\rightarrow4)$ -3,6-anhydro-D-galactose units. Several members of the carrageenan family are known, differing in their amounts of sulfate ester and/or other substituent groups, viz 5 iota carrageenan, kappa carrageenan and lambda carrageenan, of which only iota and kappa carrageenans have gelling properties.

A general formula for carrageenan is disclosed by Nijenhuis, K. in Advanced Polymer Science, 130, 203-18, (1997):



Idealised AB repeating unit of iota and kappa carrageenan polymers based on 1,3-linked β -D-galactose residue (A) and 1,4-linked 3,6-anhydro- α -D-galactose residue (B). The sequence is broken occasionally by residues of the general type B'.

Stortz, C.A. and Cerezo, A.S. describe in Carbohydrate Research, 145 (1986), 219-235, the different members of the carrageenan family by their idealised repeating units:

	Carrageenan	3-linked residue	4-linked residue
5	Beta	Beta-D-galactopyranose 4-sulfate	3,6-anhydro-alpha-D-galactopyranose
	Kappa	Beta-D-galactopyranose 4-sulfate	3,6-anhydro-alpha-D-galactopyranose
	Iota	Beta-D-galactopyranose 4-sulfate	3,6-anhydro-alpha-D-galactopyranose 2-sulfate
	Mu	Beta-D-galactopyranose 4-sulfate	Alpha-D-galactopyranose 6-sulfate
	Nu	Beta-D-galactopyranose 4-sulfate	Alpha-D-galactopyranose 2,6-disulfate
10	Lambda	Beta-D-galactopyranose 2-sulfate (70%) and Beta-D-galactopyranose (30%)	Alpha-D-galactopyranose 2,6-disulfate
	Theta	Beta-D-galactopyranose 2-sulfate	3,6-anhydro-alpha-D-galactopyranose-2-sulfate
	Xi	Beta-D-galactopyranose 2-sulfate	Alpha-D-galactopyranose 2-sulfate

However, it is well-known to anyone skilled in the art that the solubility of carrageenans in systems of high soluble solids content is very limited, see e.g. "Carrageenan" by W.R. Thomas in Thickening and Gelling Agents for Food, Ed. A. Imeson, 1992, from which it appears that iota carrageenan is insoluble at soluble

solids contents of 50% and above, whereas kappa carrageenan is only hot soluble at 50% soluble solids (SS) content. Consequently, carrageenans have in the past mainly been used either in lower SS systems or in systems not requiring any gel formation.

5 US 5,631,034 discloses a method for preparing an aqueous sugar frosting mix comprising from about 70 to about 90 % by weight of sugar, from about 9 to about 29% by weight of aqueous liquid and from about 0.05 to about 1.0% by weight of a crystal growth inhibitor. Said crystal growth inhibitor may be a carrageenan. The purpose of the use of carrageenan in this system is to inhibit crystal growth of the sugar and to provide binding properties of the sprayable solution.

10 US 5,306,519 discloses a syrup composition having a sufficiently low viscosity so that it can be poured or pumped yet upon contact with a calcium containing confection its viscosity increases. Said syrup comprises from about 25 to about 60 % sugar solids, water, at least one sequestrant, and an amount of at least one calcium reactive gum sufficient to thicken the syrup upon contact with the calcium containing confection. Said calcium reactive gum may be a carrageenan which may be incorporated
15 into the syrup at a level from about 0.05 to about 0.5 %, preferably from about 0.1 to 0.3 %.

WO 95/12985 discloses an injectable fondant and method of manufacturing same. Said injectable fondant presents in its cooled state, at least 0,5 day after manufacture, a solids content of 68 - 75 % by weight, including less than 1 % by weight of
20 stabiliser. Said stabiliser may be a carrageenan.

US 5,607,716 discloses a low or no fat, water and sugar based high solid confection comprising at least 80 % to 90 % total solids by weight, wherein the carbohydrate content is at least 70 % by weight of the total solids, a cation containing edible
25 material, a cation reactive and thermosensitive hydrocolloid, and up to 7 % by weight of fat, said confection having a water activity below 0.65 and a pH from 3.0

to 8.5. The hydrocolloid may be a carrageenan in an amount of from 0.25 to 3.5 % by weight.

US 5,132,128 discloses a dessert topping having a pH greater than 4,6 and having a water activity of less than 0,84 and comprising a blend of carrageenan gum, a powdered cellulose bulking agent, a non-heat thinning cellulose gum bulking agent, high fructose corn syrups, an edible humectant and non-fat milk. The carrageenan gum may be used in an amount in the range of 0.75-1.75 % by weight of said topping, and the high fructose corn syrup is in the range of 50-60 % by weight of said topping. Said blend of carrageenan gum provides both gelling and viscosity control in order to obtain a suitable low viscosity upon heating while providing a viscous texture of the topping when placed on a dessert, particularly ice cream.

EP 0 045 522 A2 discloses edible food containers for use with a food product by applying a barrier coating composition to at least the interior surface thereof. The barrier coating composition comprises a sugar solution having a sugar content of at least 50% by weight and optionally other ingredients such as a flavour-producing material or a vegetable gum. Said gum material, which may be a carrageenan, may be present in an amount of about 0.1 to 2% by weight. The barrier coating composition forms a film, which through the use of said gum material adheres to the inner surface of the food container.

EP 0 366 248 A2 discloses preservative compositions for fruits and vegetables comprising antidiscolouration agent and edible thixotropic gum. A typical composition may contain 20-60% by weight of edible bulk filler (eg maltodextrin, preferably a low dextrose equivalent maltodextrin), 20-60 % ascorbic acid and 1-50 % edible thixotropic gum and 1-25 % natural or artificial flavouring. Thus, a thixotropic material is provided.

WO 98/20860 discloses a chewable composition for delivery of a pharmacologically active material to a user comprising sweetener, carrageenan and water, said composition comprising from about 50 to about 83 % of solids. Carrageenan may be present in an amount from about 2% to 5,5% and optionally one or more of an additional
5 hydrocolloid is present in a total amount of from about 0.5 % to about 2% . Any suitable sweetener may be used.

EP 0 273 001 discloses a soft, sugarless, aerated confectionery comprising soluble solids in the form of hydrogenated starch hydrolysates in the range from 35 to 89%
10 by weight and up to 5.5 % by weight of hydrocolloid such as a seaweed extract. The disclosed confectionery does not include any sugar and is deposited at temperatures of about 130 to 140° C.

US 5,603,979 discloses a method for the preparation of a fat-free peanutbutter like product comprising 15-40% by weight of water, 0.5 - 1.5 % by weight of natural
15 gum, 5-20% by weight of peanut flour, 20 - 35% by weight of syrup and 5-13 % by weight of humectant. Carrageenan may be used as gum component. The product obtained must be spreadable.

Thus, as can be seen, the prior use of carrageenan has either been in lower soluble solids systems or in non-gelled end-products. Alternatively, the application of high
20 operating temperatures have been required. It has hitherto not been possible to disperse efficiently a carrageenan in a high solids system at a temperature of below 100° C at atmospheric pressure in order to form a gelled end-product, in which said carrageenan provides the main gel structure and texture.

Brief Description of the Invention

25 The object of the present invention is thus to provide a gelled food composition having high soluble solids content wherein said composition has an adequate low

viscosity during depositing in e.g. moulds, gels rapidly and can successfully be produced at temperatures not requiring special apparatuses or arrangements to be met.

In its first aspect, the present invention relates to a food composition comprising
5 soluble solids in the range of 50% to 90% by weight, at least 70% by weight thereof
being a sweetening system comprising sucrose and non sucrose sweeteners in a
weight ratio of sucrose to non sucrose sweeteners of 0:100 to 95:5, wherein the non
sucrose sweetener is of a DE (Dextrose Equivalent) of at least about 30, a carragee-
nan component in an amount sufficient to form a gel, and water to balance, wherein
10 the gelation temperature of said composition is $< 95^{\circ}\text{C}$.

By the term "gelation temperature" is meant the temperature, at which the gel-form-
ing process is initiated. It is determined as the intersection of the graphs of elastic
modulus, G' , and viscous modulus, G'' , of any given product.

The elastic modulus, G' , indicates the solid behaviour of a gel, and is a measure of
15 the gel strength, while the viscous modulus, G'' , indicates the liquid behaviour of the
gel, which correlates to the degree of bounciness and trembling of the gel.

In a second aspect, the present invention provides a process for producing a food
composition as defined above comprising (a) dispersing carrageenan in a syrup of a
non sucrose sweetener at a temperature sufficient to disperse the carrageenan in said
20 syrup while stirring, (b) adding water and heating the mixture to the boiling point
thereof, (c) adjusting the soluble solids content to from about 50% to about 90% by
weight, (d) depositing said mixture, and (e) cooling said mixture to below the deposi-
ting temperature of said mixture.

As used herein, the term "depositing temperature" means the lowest temperature, at
25 which depositing is possible, i.e. at which temperature the food composition is still

flowable, such as through a "Mogul" plant or depositor.

In a third aspect, the present invention provides the use of a carrageenan component for gelling a food composition of a soluble solids content of about 50 to about 90% by weight, at least 70% by weight thereof being a sweetening system comprising
5 sucrose and non sucrose sweeteners in a weight ratio of sucrose to non sucrose sweeteners of 0:100 to 95:5, wherein the non sucrose sweetener is of a DE of at least about 30, and wherein the gelation temperature of said composition is $< 95^{\circ}\text{C}$.

Brief Description of the Drawing

The invention is described in more details with reference to the accompanying drawing, wherein
10

Figs 1.1 to 1.9 illustrate viscosity, elastic modulus, G' , and viscous modulus G'' , versus temperature for food compositions produced according to example 8, and

Fig 2 illustrates viscosity, elastic modulus, G' , and viscous modulus, G'' , versus temperature for food compositions I, II and VI according to Example 9.

15 Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the scope of the invention will become apparent to those skilled
20 in the art from this detailed description.

Best mode for carrying out the invention

The food composition according to the invention in a preferred embodiment comprises a sweetening system comprising sucrose and non sucrose sweeteners in a weight ratio of sucrose to non sucrose sweetener of 0:100 to 95:5, wherein the non
5 sucrose sweetener is a hydrogenated starch hydrolysate syrup of a DE of at least about 30, preferably a DE > 30 fructose or glucose syrup.

In a particularly preferred embodiment of the present invention, said non sucrose sweetener is a hydrogenated starch hydrolysate syrup with a DE of at least about 40, preferably a DE > 40 fructose or glucose syrup.

10 As used herein, the term "DE" stands for "Dextrose Equivalent". DE indicates the degree to which a carbohydrate starting material has been decomposed to dextrose.

Thus, it has been found that at DE values below about 30, the carrageenan employed will swell excessively, leading to excessive gelling causing a gelation temperature well above 100° C. However, gelation temperatures of above 100° C are undesirable
15 from a practical point of view, necessitating special precautions and requirements in terms of e.g. apparatus.

By employing the above mentioned sweetening system, it has, however, surprisingly been shown that it is possible to dissolve a carrageenan component in a high solids system of about 50 to about 90% by weight of soluble solids using a minor amount
20 of water. A particular advantage of the present invention is thus the fact that the amount of water added can be limited compared to a conventional process whereby less energy is needed for the subsequent evaporation thereof to obtain a final product of a desired soluble solids content. The present invention thus represents a substantially increased process efficiency.

In a preferred embodiment, the non sucrose sweetener is a hydrogenated starch hydrolysate syrup with a DE in the range of about 40 to about 100, particularly preferred about 50 to 90, especially about 60 to 70. A non sucrose sweetener with a maltose content $\geq 50\%$ and a DE of about 50 to 60 is particularly preferred. Said
5 embodiment provides the optimum characteristics in terms of sweetness level, texture and solubility of the gelled food composition.

In another embodiment of the present invention, the sucrose and/or non-sucrose sweeteners can be replaced wholly or partly by an aqueous solution of a sugar alcohol. Said sugar alcohol is preferably, but not exclusively, selected among sorbitol,
10 mannitol, xylitol, isomalt, lactitol, maltitol or a maltitol syrup.

In a preferred embodiment of the present invention, the sweetening system comprises sucrose and non sucrose sweeteners in a weight ratio of sucrose to non sucrose sweetener of from about 10:90 to about 70:30, preferably from about 20:80 to about 30:70, particularly preferred about 1:2. Thus, it has been found that at the disclosed
15 ratios, an acceptable sweetness level still providing a composition having a gelation temperature of $< 95^{\circ}\text{C}$ is obtained.

Particularly preferred, the gelation temperature of said food composition is $< 85^{\circ}\text{C}$, preferably $< 80^{\circ}\text{C}$.

The present invention is highly suitable for preparing gelled food compositions
20 having high soluble solids content. In a preferred embodiment, said soluble solids content is in the range of 70 to 85% by weight, particularly preferred about 75 to 80% by weight.

Advantageously, at least about 80%, preferably at least about 90% of the soluble solids are comprised by the above sweetening system. Thus, it has been shown that
25 even at such high concentrations of sweetening system a gelled product having a

satisfactory gelation temperature may be obtained.

As carrageenan component an iota carrageenan or a kappa carrageenan or mixtures thereof are employed, preferably in an amount of about 0.25 to 10.0% by weight, preferably about 0.75 to 5.0%, especially about 1 to 3% by weight of the food composition. Suitable carrageenans are commercially available as e.g. GENUTM type X-8300, X-8302, and X-9303 from Hercules Copenhagen, Denmark, or GENU-GELTM type WR-713 or X-8605, likewise available from Hercules Copenhagen.

While the above carrageenans are the preferred ones, it must be understood that the invention is not limited thereto. Thus, any carrageenan component, which will provide the required gelling capability, may be employed in a food composition according to the present invention. More particularly, a carrageenan component in a non-purified form, such as in the form of seaweed, particularly red seaweeds, may also be employed.

Further, one or more additional hydrocolloids may be employed in combination with the above disclosed carrageenans to provide a particular gelling property, such as pectin, e.g. GENUTM Pectin, available from Hercules Copenhagen, agar-agar, e.g. GENUTM Agar, available from Hercules Copenhagen, cellulose, such as AVICELTM, cellulose extracts and derivatives such as carboxy methyl cellulose (CMC), e.g. Blanose cellulose gum, methyl cellulose, e.g. BenecelTM, hydroxy propyl cellulose, e.g. Klucel, hydroxy propyl methyl cellulose and mixtures thereof, starch, such as AvebeTM Perfectagel MPT, AvebeTM Perfectagel 928 and AvebeTM Perfectamyl Gel MB, alginates, xanthans such as Keltrol or Kelgum from Kelco Biopolymers, curdlan, gelatine, guar, locust bean gum, tara gum, karaya gum, gellan gum such as Kelcogel from Kelco Biopolymers, furcellaran, tragacanth, and gum arabic, generally in an amount of up to about 10% by weight.

As further optional ingredients, conventional additives to obtain a desired, tasty food composition, may be added, such as conventional milk solids, vitamins, minerals, food grade acids and salts thereof, flavourings, colourings, artificial sweeteners, preservatives, bulking agents such as SimplexTM from Kelco Biopolymers,
5 isomaltose, trehalose, tagatose, erythritol and polydextrose

Suitable food grade acids comprise inter alia citric acid, fumaric acid, acetic acid, adipic acid, malic acid, ascorbic acid, tartaric acid, lactic acid, sorbic acid and mixtures thereof.

As flavourings may be employed any food grade flavourings desired for the particular purpose, such as fruit flavours, e.g. strawberry, raspberry, orange or lemon,
10 vanilla, peppermint, wintergreen, cinnamon, eucalyptus, coffee, tea, liquorice, etc. Further food grade colourings may be added to obtain a desired appearance of the food composition.

Optionally, one or more artificial sweeteners may be employed in order to obtain a particular sweetness level, such as saccharin and salts thereof, cyclamate salts,
15 acesulfame K, aspartame, alitame, neohesperidin DC, sucralose, stevioside, and thaumatin.

As preservatives any approved preservative may be used, such as benzoic acid, sorbic acid and salts and esters thereof.

20 It has been found that the above disclosed food composition allows obtention of a lowering of the gelation temperature of the food composition in question to less than 95° C. A lowering of the gelation temperature and, consequently, the depositing temperature represents a substantial improvement in the confectionery industry, since less complicated apparatuses and simpler and more cost effective production methods
25 may be employed during manufacture.

The food composition according to the invention is in a preferred embodiment a high sugar confectionery, such as soft candies, also known as wine gums, gummy candies or chews. Thus, it has been shown that the present invention provides a food composition having a unique new texture resembling the chewiness conventionally obtained
5 by means of gelatine as gelling agent.

The food composition in another embodiment of the invention is an aerated confectionery and further comprises a whipping agent. Aerated confectioneries, such as marshmallows, can thus successfully be prepared by the present invention.

Further, the food composition according to the invention can take the form of glaz-
10 ings.

It must be appreciated, however, that the present invention is not limited to the above disclosed specific embodiments. On the contrary, the present invention may be employed to produce a variety of other high sugar confectioneries, such as leathers, angel kisses, chocolate containing candies, fillings, reversible glazings, heat stable
15 glazings, thixotropic glazings, nappages, lollypops, liquorice products, candy bars, jelly beans and pastils etc.

The present invention also provides a process for producing the food composition according to the invention by (a) dispersing carrageenan in a syrup of a non sucrose sweetener at a temperature sufficient to disperse the carrageenan in said syrup while
20 stirring, (b) adding water and heating the mixture to the boiling point thereof, (c) adjusting the soluble solids content to from about 50% to about 90% by weight, (d) depositing said mixture and (e) cooling said mixture to below the depositing temperature of said mixture. Any sucrose to be employed in order to obtain a desired sweetness level is added after heating the mixture to the boiling point thereof.

The food composition obtained through the above process is preferably deposited in moulds and left to stand for a few minutes up to about one hour. Thus, whereas prior art gelatine gelled confectioneries tend to adhere to moulds of plastics and metal and consequently have to be deposited in starch moulds and necessitates standing for up to a week in order to obtain a final texture, the food composition according to the invention gels instantaneously, can be deposited in any type of mould, such as metal and plastic moulds, and can be demoulded within minutes up to about one hour. The present invention thus allows a faster and more flexible production of gelled food compositions.

10 Any further ingredients of the food composition, such as food grade acids, flavourings, colourings, artificial sweeteners or preservatives are preferably added after adjustment of the soluble solids content in step (c). In the case of production of aerated confectioneries, a whipping agent is separately mixed with water and any icing or confectioner's sugar and beaten to a stiff foam before addition to the high solids composition.

While the above disclosed process is the preferred one, the present invention is not limited thereto. Thus, the food composition according to the invention may also be produced by a process, whereby carrageenan is dispersed in sucrose, if any, the dry mixture obtained is dissolved in water and heated, non sucrose sweetener and optionally any additional sucrose is added to the hot mixture, whereupon the soluble solids content is adjusted to the desired level. Finally, the product obtained is cooled to below the depositing temperature. The latter process is particularly useful in connection with the preparation of glazings.

Further, the food composition according to the invention may be prepared by dispersing carrageenan in water while heating, adding said dispersion to a hot sweetener solution, whereupon the soluble solids content is adjusted to the desired level and any additional ingredients are added.

The present invention also provides the use of a carrageenan component for gelling a food composition of a soluble solids content of about 50 to about 90% by weight, at least 70% by weight thereof being a sweetening system comprising sucrose and non sucrose sweeteners in a weight ratio of sucrose to non sucrose sweeteners of 0:100 to 95:5, wherein the non sucrose sweetener is of a DE of at least about 30, and wherein the gelation temperature of said composition is below 95°C. The carrageenan component is preferably an iota carrageenan or a kappa carrageenan or mixtures thereof.

Thus, a vegetable alternative to gelatine has been provided giving a product of a similar texture as gelatine gelled products and which allows the preparation of food compositions of high soluble solids content in a cost and energy efficient, industrially applicable process.

Examples

In the examples given below the following apparatus and chemicals have been used to prepare and test food compositions according to the invention:

Apparatus:

- Texture Analyzer, TA-XT2. 5 kg. Software Texture Expert™, manufactured by Stable Micro Systems, England.

Chemicals:

- Sucrose, food grade, Danisco A/S, Denmark
- Citric acid, monohydrated, MERCK in 50% w/v solution
- Tri-sodium citrate, 2H₂O, MERCK
- GENUTINE™ types X-8302, X-8300, and X-9303 carrageenan, Hercules

Copenhagen, Denmark

- GENUGEL™ types WR-713 and X-8605 carrageenan, Hercules Copenhagen, Denmark
- GENU™ type 900-A1 Agar, Hercules Copenhagen, Denmark
- 5 • Glucose syrup (DE 39 to 42) 80 to 84% SS, IGOS, Denmark
- High Iso Fructose FT-1750 (DE 95), Cerestar, Denmark
- High Maltose glucose syrup (DE 54), Cargill HM 70, 80% SS, Cargill, The Netherlands
- Glucose HMF 70.9, 80% SS, Cargill, The Netherlands
- 10 • Invert syrup (DE 95)
- Glucose syrup FT 01700 (DE 62 64), Cerestar, Denmark
- Maltitol syrup Lyasin 80/55, Roquette, Lille Cedex, France
- Hyfoama™ DSN whipping agent.

Example 1.1

- 15 • High Maltose glucose syrup (DE 54) Cargill HM 70, 80% SS, Cargill, The Netherlands.

Preparation of a gelled soft candy (wine gums) containing 60% SS and a ratio of DE 40 glucose syrup:DE 95 fructose syrup:sucrose of 27:13:60.

- 362.2 g of DE 40 glucose syrup and 207.8 g of DE 95 fructose syrup (components
- 20 A) are heated to about 60°C in a sauce pan. 50.0 g of iota carrageenan type X-8300 (component B) is added to the syrup while stirring with a high speed mixer.

Upon complete dispersion of the carrageenan 870.6 g of water and a buffering agent in the form of 20.8 g of tri-sodium citrate (components C) are added to the slurry which is then heated to the boiling point (100°C) while stirring.

Thereafter 659.6 g of sucrose (component D) is added to the slurry which is then boiled (100°C) while stirring to adjust the content of soluble solids to 60% by weight by evaporation of water.

To this slurry 40.0 g of 50% w/v citric acid (component E) is added in order to
5 obtain a pH of about 3.8 while stirring to obtain a total of 2 kg of final slurry.

The slurry is then poured into a hot depository funnel and filled into moulds. After depositing for about one hour a soft candy with a firm and chewy texture is obtained. The depositing temperature of the individual samples is noted. The average depositing temperature of slurry 1.1 is presented in table VI together with the texture of the
10 deposited slurries, as well as their pH and content of soluble solids tested according to the measurement methods given below.

Examples 1.2 to 4.4

Table I provides a recipe for preparing the soft candies according to examples 1.2 to 4.4. The amount of each ingredient used in the preparation of these are given in
15 grams per 100 grams of final slurry. The method of preparation is performed analogously to Ex. 1.1.

Table I

Ingredients added in the preparation of soft candies (wine gums) according to the examples 1.1 to 4.4

Component	Ingredients	%SS	Ex. 1.1		Ex. 1.2	
			(g)	(g) SS	(g)	(g) SS
A	40 DE syrup	84	18.11	15.21	21.37	17.95
	95 DE fructose syrup	70	10.39	7.27	12.26	8.58
B	GENUTINE™ type X-8300 carrageenan	100	2.50	2.5	2.50	2.5
C	Water 1:1	0	43.53	0	32.44	0
	Tri-sodium citrate	100	1.04	1.04	1.04	1.04
D	Sucrose	100	32.98	32.98	38.93	38.93
E	Citric acid 50% w/v	50	2.00	1	2.00	1
	Evaporation		10.54		10.54	
	Yield		100		100	
	Yield soluble solids			60		70

Table I (cont.)

Component	Ingredients	%SS	Ex. 2.1		Ex. 2.2	
			(g)	(g) SS	(g)	(g) SS
	60 DE glucose syrup	80	55.13	44.1	65.06	52.05
B	GENUTINE™ type X-8300 carrageenan	100	2.50	2.5	2.50	2.5
C	Water 1:1	0	38.52	0	26.53	0
	Tri-sodium citrate	100	1.04	1.04	1.04	1.04
D	Sucrose	100	11.36	11.36	13.41	13.41
E	Citric acid 50% w/v	50	2.00	1	2.00	1
	Evaporation		10.54		10.54	
	Yield		100		100	
	Yield soluble solids			60		70

Table I (cont.)

Component	Ingredients	%SS	Ex. 3.1		Ex. 3.2		Ex. 3.3	
			(g)	(g) SS	(g)	(g) SS	(g)	(g) SS
A	95 DE fructose syrup	70	63.00	44.1	74.36	52.05	85.71	60
B	GENUTINE™ type X-8300 carrageenan	100	2.50	2.5	2.50	2.5	2.50	2.5
C	Water 1:1	0	30.64	0	17.23	0	3.83	0
	Tri-sodium citrate	100	1.04	1.04	1.04	1.04	1.04	1.04
D	Sucrose	100	11.36	11.36	13.41	13.41	15.46	15.46
E	Citric acid 50% w/v	50	2.00	1	2.00	1	2.00	1
	Evaporation		10.54		10.54		10.54	
	Yield		100		100		100	
	Yield soluble solids			60		70		80

Table I (cont.)

Component	Ingredients	%SS	Ex. 4.1		Ex. 4.2		Ex. 4.3		Ex. 4.4	
			(g)	(g) SS	(g)	(g) SS	(g)	(g) SS	(g)	(g) SS
A	60 DE glucose syrup	80	56.61	45.29	66.55	53.24	76.49	61.19	81.46	65.17
B	GENUGEL™ type WR-713 carrageenan	100	1.00	1	1.00	1	1.00	1	1.00	1
C	Water 1:1	0	38.22	0	26.23	0	14.24	0	8.25	0
	Tri-sodium citrate	100	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
D	Sucrose	100	11.67	11.67	13.72	13.72	15.77	15.77	16.79	16.79
E	Citric acid 50% w/v	50	2.00	1	2.00	1	2.00	1	2.00	1
	Evaporation		10.54		10.54		10.54		10.54	
	Yield		100		100		100		100	
	Yield soluble solids			60		70		80		85

Example 5Preparation of sugarfree gelled soft candies

Table II provides a recipe for preparing sugarfree soft candies. The amount of each ingredient used in the preparation is given in grams per 100 grams of final slurry.

- 5 The method of preparation is performed analogously to Example 1.1.

Table II

Component	Ingredients	% SS	Example 5	
			(g)	(g) SS
A	Maltitol syrup Lyasin 80/55	75	100	75.0
B	GENUTINE™ type X-9303 carrageenan	100	2.5	
C	Water	-	5.0	
	Tri-sodium citrate	100	0.5	0.5
D	Citric acid, 50% w/w	50	1.0	0.5
	Evaporation		9.0	
	Yield		100	
	Yield soluble solids			78.5

Example 6.1Preparation of an aerated food composition (marshmallows)

Aerated confectioneries (marshmallows) were produced according to the following table:

5

Table III

Component	Ingredients	% SS	(g)	(g) SS
A	Water	-	16.00	-
	Sucrose	100	46.00	46.00
	Glucose syrup (DE-39)	84	18.00	15.12
	Invert syrup	75	19.00	14.25
B	Water	-	13.50	-
	GENUTINE™ type X-8300	100	1.12	1.12
	GENU™ Agar type 900-A1	100	0.45	0.45
C	Water	-	6.50	-
	Icing sugar	100	3.00	3.00
	Hyfoama™ DSN	100	0.40	0.40
D	Flavour and colour		Optional	
	Evaporation		23.97	
	Yield		100.00	
	Yield soluble solids			80.34

10

A sugar syrup is prepared by mixing the components (A) and heating to the boiling point. Separately a dispersion of carrageenan and a further hydrocolloid in the form

of GENU™ type 900-A1 agar is dispersed in 90° C water (Component B) while stirring with a high speed mixer for two minutes. Component (B) is added to component (A) and boiled to 86% of soluble solids. Separately therefrom the ingredients of component (C) are mixed and beaten to a stiff foam.

- 5 The mixture of component (A) and (B) is slowly added to component (C) while whipping and beating for about three minutes at high speed.

Thereupon, optional flavour and colour are added, and the slurry is deposited immediately in a hot state in a manner analogous to example 1.1.

Example 7.1

- 10 Preparation of a high sugar glazing

A high sugar glazing was produced according to the following table.

Table IV

Component	Ingredients	% SS	(g)	(g) SS
A	GENUGEL™ type X-8605 carrageenan	100	0.4	0.4
	Sucrose	100	4.0	4.0
	Tri-sodium citrate	100	0.6	0.6
B	Water	-	18.0	-
C	Sucrose	100	20.0	20.0
D	Glucose syrup**	80	60.0	48.0
E	Potassium sorbate 20% w/v	20	0.5	0.1
F	Citric acid 50% w/v	50	1.4	0.7
	Evaporation		4.9	
	Yield		100.0	
	Yield soluble solids			74.0

** Cerestar FT 01700.

- 10 The ingredients of Component (A) are dry-blended and dispersed in component (B) and heated to boiling to dissolve the carrageenan. Component (C) is added while heating, whereupon Component (D) is mixed thereto under continued heating. The heating is continued to obtain a soluble solids content in the range of 73 to 75%, whereupon Component (E) as a preservative and Component (F) as a buffer is added.
- 15 The composition is deposited as disclosed in example 1.1.

The texture of the above food composition is short, creamy and very transparent. It can be melted without dilution by heating to 60 to 70° C. However, it may also be diluted by about 20% of water to obtain a glazing suitable for fruit and ice cream tarts.

Examples 7.2 to 7.4

Further glazing compositions were produced analogously with the above disclosed procedure. The recipes used appear from the below table V.

Table V

Component	Ingredients	Ex. 7.2			Ex. 7.3			Ex. 7.4		
		% SS	(g)	(g) SS	% SS	(g)	(g) SS	% SS	(g)	(g) SS
A	GENUGEL™ type X-8605	100	0.4	0.4	100	0.4	0.4	100	0.4	0.4
	carrageenan									
	Sucrose	100	4.0	4.0	100	4.0	4.0	100	4.0	4.0
	Tri-sodium citrate	100	0.6	0.6	100	0.6	0.6	100	0.6	0.6
B	Water	-	20.0	-	-	17.0	-	-	15.0	-
C	Sucrose	10.0	17.0	17.0	100	22.0	22.0	100	27.0	27.0
	Glucose syrup*	80	60.0	48.0	80	60.0	48.0	80	60.0	48.0
D	Citric acid 50% w/v	50	1.4	0.7	50	1.4	0.7	50	1.4	0.7
	Evaporation		3.4			5.4			8.4	
	Yield		100.0			100			100	
	Yield soluble solids		70.7				75.7			80.7

* CERESTAR FT 01700

The texture of the products of ex. 7.2 to 7.4 is pleasantly soft, creamy and short.

Test results of the above compositions appear from the table VII below.

Experimental results

Measurement methods:

- 5 Texture, pH and content of soluble solids are determined as follows:

Texture

The textures of the deposited samples are characterised by the following parameters:

- Break strength (BS) (in grams of force), at 5°C, Gel strength (in grams of force), at 5° C at a 2 mm, 4mm, and 8 mm compression distance, and Distance to break (DT) at 5° C, which parameters are measured with a Texture Analyzer on test samples deposited in Bloom glasses.
- 10

Bloom glasses: Pyrex™ glass cylinders of a diameter of 700 mm and a height of 40 mm, available from Bibby Sterilin Ltd., Stone, Staffordshire, Great Britain.

Break strength.

- 15 The Break strength (BS) is determined as the force (in grams) required to compress the sample to break with a 0.5" (1.25 cm) diameter probe.

Gel strength.

The Gel strength is determined as the force (in grams) required to compress the gel 2, 4, and 8 mm, respectively, with a 0.5" (1.25 cm) diameter probe.

Distance to break.

The Distance to break (DT, Distance Travelled) is determined as the distance (in mm) it takes to break the gel.

In these experiments the probe speed is 1 mm/sec.

5 *Refractometer.*

Part of the gel from one of the Bloom glasses is used for measurement of soluble solids in a refractometer, available from Bellingham & Stanley Ltd., Great Britain, covering the range 40 to 80% SS or 75 to 93% SS.

Depositing temperature.

- 10 Said temperature is measured with a thermometer placed in the centre of a depository funnel. The depositing temperature is read as the temperature just before the material is non-flowable.

Gelation temperature.

- 15 The gelation temperature, T_{gel} , is the temperature at which the gel-forming process initiates. It is determined as the intersection of the graphs of elastic modulus, G' , and viscous modulus, G'' , respectively.

Rheological measurements: Rheological measurements to determine the elastic modulus, G' , the viscous modulus, G'' , as well as the viscosity versus temperature were performed using a Haake Rheometer, RS100, Rheostress, Haake, Germany.

- 20 Measurements were performed using the following settings:

-Gradient 1 °C/min, 0,4640 Hz

95 °C-65 °C, $t=1800$ s, 0,50 Pa

65 °C-35 °C, $t=1800$ s, 2,50 Pa

-Stress sweep 35°C

0,10 Pa-20,00 Pa, 0,4640 Hz

Springiness.

Springiness is a measure of the ability of the sample to regain its original shape after
 5 compression. The sample is placed under a cylinder probe, avoiding any irregular or
 non-representative areas. The probe then compresses the sample until it has com-
 pressed 20 % of the product height. The probe holds this position for 60 seconds and
 then withdraws from the sample and returns to its starting position. The force on the
 probe after 60 seconds at the 20%-position is recorded (F 60). % springiness is
 10 calculated from the expression:

$$\% \text{ springiness} = \frac{F_{60}}{F_0} \times 100\%$$

wherein F_0 is the force measured after 0 seconds.

Test results for examples 1.1 to 4.4 and 7.2 to 7.4 appear from the below Tables VI
 15 and VII, respectively.

Table VI

Test results for examples 1.1 to 4.4, soft candies (wine gums)

	Ex. 1.1	Ex. 1.2	Ex. 2.1	Ex. 2.2
% SS (calculated)	60	70	60	70
Sucrose:Non sucrose	60:40	60:40	20:80	20:80
DE of non sucrose	~DE 60	~DE 60	DE 60	DE 60
TAXT2 measurements in Bloom glasses				
Gel strength	2 mm (g)	6.7	6.8	6.9
	4 mm (g)	15.3	16.2	16.3
	8 mm (g)	40.0	41.2	41.0
BS (g)	739	873	660	830
DT (mm)	29.6	29.8	29.3	30.0
Depositing temperature (°C)	74-76	84-86	76-78	84-86
pH	3.8	3.8	3.8	3.9
% SS (measured)	60.0	70.0	60.0	67.0

Table VI (cont.)

T.A.XT2 measurements in Bloom glasses								
	Ex. 3.1	Ex. 3.2	Ex. 3.3	Ex. 4.1	Ex. 4.2	Ex. 4.3	Ex. 4.4	
% SS (calculated)	60	70	80	60	70	80	85	
Sucrose:Non sucrose	20:80	20:80	20:80	20:80	20:80	20:80	20:80	
DE of non sucrose	DE 95	DE 95	DE 95	DE 60	DE 60	DE 60	DE 60	
T.A.XT2 measurements in Bloom glasses								
Gel strength	2 mm (g)	9.3	8.1	8.8	298	347	194	118
	4 mm (g)	18.8	17.6	19.2	623	706	546	379
	8 mm (g)	44.1	42.8	45.2	254	395	1335	1234
BS (g)	453	555	714	417	534	1403	2140	
DT (mm)	26.4	27.1	30.0	27.4	29.2	9.1	14.1	
Depositing temperature (°C)	67-69	74-76	86-88	53	63	86	76	
pH	3.8	3.8	3.7	3.9	4.0	4.0	4.0	
% SS (measured)	57.0	68.0	79.0	65.0	68.0	79.0	83.0	

Table VII

Test results for examples 7.2 to 7.4, glazings

		Ex. 7.2	Ex. 7.3	Ex. 7.4
% SS		70.7	75.7	80.7
Sucrose:Non sucrose		30:70	35:65	40:60
DE of non sucrose		62	62	62
TA.XT2 measurements in Bloom glasses				
Gel strength	2 mm (g)	93	93	35
	4 mm (g)	185	238	112
	8 mm (g)	181	239	333
BS (g)		274	347	444

Example 8

10 Further test results were obtained, in which gelled soft candies (wine gums) were prepared essentially as described in the above examples 1.1. to 4.4, using GENUTI-NE™ X-9303 carrageenan at a fixed amount of 2.5%, but varying the weight ratios of sucrose and non-sucrose sweeteners, the DE values of the non sucrose sweetener, and the % SS values.

15 The characteristics of the different preparations were then determined, and the test results are listed in Table VIII below. Also, the corresponding data (G' , G'' , and viscosity) are shown in Figs 1.1 to 1.9.

Viscosity (mPa's), elastic modulus G' (Pa), and viscous modulus G'' (Pa) were plotted as a function of the temperature in Figs 1.1-1.9. The data were obtained,

using a Haake rheometer.

The gelation temperature of each composition is read from each of the Figs 1.1 to 1.9 as the temperature at which the respective G' curve and the G'' curve intersects.

All the compositions tested resulted in gelation temperatures below 95°C , water
5 activities above 0.65 and springiness values above 30 (Table VIII).

Table VIII

Ex. No	Use level	Carrageenan	Gelation temp. (°C)	Deposit temp.	Viscosity at 95°C	Syrup: sugar	Syrup type	DE	% Soluble solids	Aw	Springiness %
8.1	2.5	GENUTINE™ X-9303	81.1	75	2788	4:1	HM 70	DE 54	79(81)	0.705	48.1
8.2	2.5	GENUTINE™ X-9303	71.3	71	1455	2:1	HM 70	DE 54	76		49.4
8.3	2.5	GENUTINE™ X-9303	80.0	76	3293	2:1	Igos	DE 40	76		44.4
8.4	2.5	GENUTINE™ X-9303	74.2	70	974	2:1	Igos	DE 40	73		
8.5	2.5	GENUTINE™ X-9303	73.5	71	796	2:1	HM 70	DE 54	73		
8.6	2.5	GENUTINE™ X-9303	89.7	87	9699	4:1	Igos	DE 40	79.5	0.711	38.7
8.7	2.5	GENUTINE™ X-9303	78.3	80	2019	4:1	HM 70	DE 54	76	0.724	41.2
8.8	2.5	GENUTINE™ X-9303	85.5	81	3862	5:95	HM 70	DE 54	78.5	0.673	31.1
8.9	2.5	GENUTINE™ X-9303	81.4	77	3212	100:0	HM 70	DE 54	79	0.718	52.6

As it appears, all formulations tested gave satisfactory results in terms of gelation temperatures well below 95°C, and a springiness in the order 40-50 %.

Example 9

US 5,607,716 discloses a low fat confectionery gelled by the use of carrageenan. The confectionery according to US 5,607,716, however, does not possess the desired characteristics according to the present invention in terms of gelation temperature, ease of
5 handling, and springiness.

In order to further verify this, tests were performed comparing compositions prepared according to the recipes of examples 6 and 8 of the US 5,607,716 patent.

The type of carrageenan used in this comparative test was GENUTINE™ X-9303 and the results are shown in table X and Fig 2 below, wherefrom the gelation temperature
10 (intersection point of the G' and G'' curves) is obtained.

The compositions were:

- I. Composition prepared according to example 6 of US 5,607,716, however using 0.2% GENUTINE™ X-9303, and 87% SS.
- II. Composition prepared according to example 8 of US 5,607,716, however using
15 0.6% GENUTINE™ X-9303, and 89% SS.
- III. Composition prepared according to example 6 of US 5,607,716, increasing the amount of GENUTINE™ X-9303 to 2.5%, the amount presently preferred according to the present invention, and reducing the SS content to 75%.
- IV. Composition prepared according to example 8 of US 5,607,716, increasing the
20 amount of GENUTINE™ X-9303 to 2.5% and reducing the SS content to 75%.
- V. Composition prepared according to the present invention containing 2.5% GENUTINE™ X-9303, 79% SS, a sucrose:non sucrose ratio of 1:4, and a DE 54

of the non-sucrose sweetener.

VI. Composition prepared as in V with 5% evaporated skim milk added.

For details on the composition, see Table IX below. The results obtained are given in Table X.

5

Tabel IX

	Ingredients / Sample	I	II	III	V	VI
	Evaporated Skim Milk	36.55	34.86	31.71		6.39
	Di-sodium phosphate	0.06	0.01	0.06		
	Tri-sodium citrate				0.46	0.46
10	High Fructose syrup, 55 % fructose	61.04	58.24	52.98		
	High Maltose syrup, Cargill HM70				68.81	63.25
	Sugar				13.76	13.80
15	Butter		4.00			
	Butter flavour	0.15		0.15		
	AVICEL GP 3252	1.00	1.00	1.00		
	Water		0.30	10.60	13.76	13.80
	GENUTINE™ X-9303	0.20	0.60	2.50	2.29	2.30
20	NaCl	0.50	0.50	0.50		
	Lecithin	0.20	0.19	0.20		
	K-2000 (mono- and diglycerides)	0.30	0.30	0.30		
	Citric acid (50% w/v solution)				0.92	
25	Total	100.00	100.00	100.00	100.00	100.00

Table X

Composi- tion	Appearance	Deposition- able	Gelation temp. (° C)	Viscosity at 95° C	Springiness
I	Thick, uneven	Yes	> 95	~ 20.000	< 10
5 II	Very thick, uneven	No	> 95	~ 100.000	< 15
III	Thick, very uneven, inhomoge- neous	No	> 95	> 100.000	28
*IV	-	-	-	-	-
V	Thin, even, homoge- neous	Yes	81	~ 2.800	48
VI	Even, homoge- neous	Yes	90	~ 10.000	35

10 *This composition was not possible to make.

This test shows (Table X) that the recipe given in Examples 6 and 8 of US 5,607,716 will not result in a composition with the desired gelation temperature below 95° C, neither if the carrageenan is used in 0.2 to 0.6% amounts (see I and II), nor if the amount is increased to 2.5% (see III and IV). Only the sweetening system used accord-
 15 ing to this invention (see V and VI) will result in a product with the desired characteris-
 tics.

It is evident from the above results that the composition according to the invention (V) has the desired gelation temperature below 95° C, is easier to work with and has more springy characteristics.

The above description of the invention reveals that it is obvious that it can be varied in
5 many ways. Such variations are not to be considered a deviation from the scope of the invention, and all such modifications which are obvious to persons skilled in the art are also to be considered comprised by the scope of the succeeding claims.

Claims

1. A food composition comprising soluble solids in the range of about 50% to about 90% by weight, at least 70% by weight thereof being a sweetening system comprising sucrose and non sucrose sweeteners in a weight ratio of sucrose to non sucrose sweeteners of 0:100 to 95:5, wherein the non sucrose sweetener is of a DE (Dextrose Equivalent) of at least about 30, a carrageenan component in an amount sufficient to form a gel, and water to balance, and wherein the gelation temperature of said food composition is $< 95^{\circ}\text{C}$.
2. The composition according to claim 1, wherein said non sucrose sweetener is a hydrogenated starch hydrolysate syrup of a DE of at least about 30, preferably a DE > 30 fructose or glucose syrup.
3. The composition according to claim 1, wherein said non sucrose sweetener is a hydrogenated starch hydrolysate syrup of a DE of at least about 40, preferably a DE > 40 fructose or glucose syrup.
4. The composition according to claim 1, wherein said non sucrose sweetener is a hydrogenated starch hydrolysate syrup with a DE in the range of about 40 to about 100, particularly preferred about 50 to 90, especially about 60 to 70.
5. The composition according to claim 4, wherein said non sucrose sweetener is a high maltose glucose syrup, particularly a high maltose glucose syrup of a DE of about 50 to 60.
6. The composition according to claim 1, wherein the sucrose and/or non-sucrose sweeteners can be replaced wholly or partly by an aqueous solution of a sugar alcohol.
7. The composition according to claim 6, wherein said sugar alcohol is selected among sorbitol, mannitol, xylitol, isomalt, lactitol, maltitol or a maltitol syrup.

8. The composition according to any one of the claims 1 to 7, wherein the ratio of sucrose to non sucrose sweetener is from about 10:90 to about 70:30, preferably from about 20:80 to about 30:70, particularly preferred about 1:2.
9. The composition according to claim 1, wherein the soluble solids thereof is in the
5 range of 70 to 85 % by weight, particularly preferred about 75 to 80 % by weight.
10. The composition according to claim 1, wherein the gelation temperature of said food composition is less than 85° C, preferably less than 80° C.
11. The food composition according to claim 1, wherein at least about 80 %, preferably at least about 90 % of the soluble solids are comprised by said sweetening system.
- 10 12. The composition according to claim 1, wherein said carrageenan component is an iota carrageenan or a kappa carrageenan or mixtures thereof.
13. The composition according to claim 12, wherein said carrageenan is present in an amount of about 0.25 to 10.0 % by weight, preferably about 0.75 to 5.0 %, especially about 1 to 3 % by weight of the food composition.
- 15 14. The composition according to claim 1 further comprising as additional gelling agent a hydrocolloid selected from the group comprising pectin, agar-agar, alginates, carboxy methyl cellulose, methyl cellulose, hydroxy propyl cellulose, curdlan, xanthans, gelatine, starch and gum arabic in an amount of up to about 10.0 % by weight of the food composition.
- 20 15. The composition according to claim 1, wherein said soluble solids further comprise one or more ingredients selected among milk solids, vitamins, minerals, food grade acids and salts thereof, flavourings, colourings, artificial sweeteners, preservatives and bulking agents.

16. The composition according to claim 1, wherein said food composition is a high sugar confectionery.
17. The composition according to claim 16, wherein said food composition is soft candies or wine gum.
- 5 18. The composition according to claim 1, wherein said composition is an aerated confectionery and further comprises a whipping agent.
19. The composition according to claim 1, wherein said composition is a glazing.
20. A process for producing a food composition according to claim 1 comprising (a) dispersing carrageenan in a syrup of a non sucrose sweetener at a temperature sufficient
10 to disperse the carrageenan in said syrup while stirring, (b) adding water and heating the mixture to the boiling point thereof, (c) adjusting the soluble solids content to from about 50% to about 90% by weight, (d) depositing said mixture and (e) cooling said mixture to below the depositing temperature of said mixture.
21. The process according to claim 20, wherein sucrose, if any, is added in step (c).
- 15 22. The process according to any one of the claims 20 to 21, wherein the temperature sufficient to disperse the carrageenan in the syrup of the non sucrose sweetener is at least about 50, especially at least about 60° C.
23. The process of any one of the claims 20 to 22, wherein one or more ingredients selected among milk solids, vitamins, minerals, food grade acids, flavourings,
20 colourings, artificial sweeteners, preservatives and bulking agents is (are) added between steps (c) and (d).
24. The process according to any one of the claims 20 to 23, wherein in step (d) said hot mixture is deposited in moulds.

25. A use of a carrageenan component for gelling a food composition of a soluble solids content of about 50 to about 90% by weight, at least 70% by weight thereof being a sweetening system comprising sucrose and non sucrose sweeteners in a weight ratio of sucrose to non sucrose sweeteners of 0:100 to 95:5, wherein the non sucrose sweetener is of a DE of at least about 30, and wherein the gelation temperature of said food composition is $< 95^{\circ}\text{C}$.

26. The use according to claim 25, wherein said carrageenan is an iota carrageenan or a kappa carrageenan or mixtures thereof.

Abstract

A food composition comprising soluble solids in the range of about 50% to about 90% by weight, at least 70% by weight thereof being a sweetening system comprising sucrose and non sucrose sweeteners in a weight ratio of sucrose to non sucrose sweeteners of 5 0:100 to 95:5, wherein the non sucrose sweetener is of a DE (Dextrose Equivalent) of at least about 30, a carrageenan component in an amount sufficient to form a gel, and water to balance, and wherein the gelation temperature of said composition is $< 95^{\circ}\text{C}$.

Said food composition may be produced by a process comprising (a) dispersing carrageenan in a syrup of a non sucrose sweetener at a temperature sufficient to disperse 10 the carrageenan in said syrup while stirring, (b) adding water and heating the mixture to the boiling point thereof, (c) adjusting the soluble solids content to from about 50% to about 90% by weight, (d) depositing said mixture and (e) cooling said mixture to below the depositing temperature of said mixture.

The food composition gels rapidly and forms a gel at temperatures of below 95°C . The 15 food composition is especially confectionery products such as soft candies, marshmallows or glazings.

viscosity during depositing in e.g. moulds, gels rapidly and can successfully be produced at temperatures not requiring special apparatuses or arrangements to be met.

In its first aspect, the present invention relates to a food composition comprising
5 soluble solids in the range of 50% to 90% by weight, at least 70% by weight thereof being a sweetening system comprising sucrose and non sucrose sweeteners in a weight ratio of sucrose to non sucrose sweeteners of 0:100 to 95:5, wherein the non sucrose sweetener is of a DE (Dextrose Equivalent) of at least about 30 a carrageenan component in an amount sufficient to form a gel, and water to balance, wherein
10 the gelation temperature, determined as the intersection of the graphs of elastic modulus, G' , and viscous modulus, G'' , of said composition is $< -95^{\circ}\text{C}$ measured on a Haake Rheometer, RS 100 using the settings: - Gradient $1^{\circ}\text{C}/\text{min}$, 0,4640 Hz, $95^{\circ}\text{C} - 65^{\circ}\text{C}$, $t=1800\text{ s}$, 0,50 Pa, $65^{\circ}\text{C} - 35^{\circ}\text{C}$, $t=1800\text{ s}$, 2,50 Pa - Stress sweep 35°C 0,10 Pa- 20,00 Pa, 0,4640 Hz.

15 The elastic modulus, G' , indicates the solid behaviour of a gel, and is a measure of the gel strength, while the viscous modulus, G'' , indicates the liquid behaviour of the gel, which correlates to the degree of bounciness and trembling of the gel.

In a second aspect, the present invention provides a process for producing a food composition as defined above comprising (a) dispersing carrageenan in a syrup of a
20 non sucrose sweetener at a temperature sufficient to disperse the carrageenan in said syrup while stirring, (b) adding water and heating the mixture to the boiling point thereof, (c) adjusting the soluble solids content to from about 50% to about 90% by weight, (d) depositing said mixture, and (e) cooling said mixture to below the depositing temperature of said mixture.

25 As used herein, the term "depositing temperature" means the lowest temperature, at which depositing is possible, i.e. at which temperature the food composition is still

flowable, such as through a "Mogul" plant or depositor.

In a third aspect, the present invention provides the use of a carrageenan component for gelling a food composition of a soluble solids content of about 50 to about 90% by weight, at least 70% by weight thereof being a sweetening system comprising sucrose and non sucrose sweeteners in a weight ratio of sucrose to non sucrose sweeteners of 0:100 to 95:5, wherein the non sucrose sweetener is of a DE of at least about 30 and wherein the gelation temperature of said composition determined as the intersection of the graphs of elastic modulus, G' , and viscous modulus, G'' , measured on a Haake Rheometer, RS 100 using the settings - Gradient $1^{\circ}\text{C}/\text{min}$, 0,4640 Hz, $95^{\circ}\text{C} - 65^{\circ}\text{C}$, $t=1800\text{ s}$, 0,50 Pa, $65^{\circ}\text{C} - 35^{\circ}\text{C}$, $t=1800\text{ s}$, 2,50 Pa - Stress sweep 35°C 0,10 Pa- 20,00 Pa, 0,4640 Hz, is $< 95^{\circ}\text{C}$.

Brief Description of the Drawing

The invention is described in more details with reference to the accompanying drawing, wherein

Figs 1.1 to 1.9 illustrate viscosity, elastic modulus, G' , and viscous modulus G'' , versus temperature for food compositions produced according to example 8, and

Fig 2 illustrates viscosity, elastic modulus, G' , and viscous modulus, G'' , versus temperature for food compositions I, II and VI according to Example 9.

Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the scope of the invention will become apparent to those skilled in the art from this detailed description.

Best mode for carrying out the invention

The food composition according to the invention in a preferred embodiment comprises a sweetening system comprising sucrose and non sucrose sweeteners in a weight ratio of sucrose to non sucrose sweetener of 0:100 to 95:5, wherein the non
5 sucrose sweetener is a hydrogenated-starch hydrolysate syrup of a DE of at least about 30, preferably a DE > 30 fructose or glucose syrup.

In a particularly preferred embodiment of the present invention, said non sucrose sweetener is a hydrogenated starch hydrolysate syrup with a DE of at least about 40, preferably a DE > 40 fructose or glucose syrup.

10

As used herein, the term "DE" stands for "Dextrose Equivalent". DE indicates the degree to which a carbohydrate starting material has been decomposed to dextrose.

Thus, it has been found that at DE values below about 30, the carrageenan employed will swell excessively, leading to excessive gelling causing a gelation temperature well above 100° C. However, gelation temperatures of above 100° C are undesirable
15 from a practical point of view, necessitating special precautions and requirements in terms of e.g. apparatus.

By employing the above mentioned sweetening system, it has, however, surprisingly been shown that it is possible to dissolve a carrageenan component in a high solids system of about 50 to about 90% by weight of soluble solids using a minor amount
20 of water. A particular advantage of the present invention is thus the fact that the amount of water added can be limited compared to a conventional process whereby less energy is needed for the subsequent evaporation thereof to obtain a final product of a desired soluble solids content. The present invention thus represents a substan-
25 tially increased process efficiency.

In a preferred embodiment, the non sucrose sweetener is a hydrogenated starch hydrolysate syrup with a DE in the range of about 40 to about 100, particularly preferred about 50 to 90, especially about 60 to 70. A non sucrose sweetener with a maltose content $\geq 50\%$ and a DE of about 50 to 60 is particularly preferred. Said
5 embodiment provides the optimum characteristics in terms of sweetness level, texture and solubility of the gelled food composition.

In another embodiment of the present invention, the sucrose can be replaced wholly or partly by an aqueous solution of a sugar alcohol. Said sugar alcohol is preferably, but not exclusively, selected among sorbitol, mannitol, xylitol, isomalt, lactitol,
10 maltitol or a maltitol syrup.

In a preferred embodiment of the present invention, the sweetening system comprises sucrose and non sucrose sweeteners in a weight ratio of sucrose to non sucrose sweetener of from about 10:90 to about 70:30, preferably from about 20:80 to about 30:70, particularly preferred about 1:2. Thus, it has been found that at the disclosed
15 ratios, an acceptable sweetness level still providing a composition having a gelation temperature of $< 95^{\circ}\text{C}$ is obtained.

Particularly preferred, the gelation temperature of said food composition is $< 85^{\circ}\text{C}$, preferably $< 80^{\circ}\text{C}$.

The present invention is highly suitable for preparing gelled food compositions having high soluble solids content. In a preferred embodiment, said soluble solids
20 content is in the range of 70 to 85% by weight, particularly preferred about 75 to 80% by weight.

Advantageously, at least about 80%, preferably at least about 90% of the soluble solids are comprised by the above sweetening system. Thus, it has been shown that
25 even at such high concentrations of sweetening system a gelled product having a

satisfactory gelation temperature may be obtained.

As carrageenan component an iota carrageenan or a kappa carrageenan or mixtures thereof are employed, preferably in an amount of about 0.25 to 10.0% by weight, preferably about 0.75 to 5.0%, especially about 1 to 3% by weight of the food composition. Suitable carrageenans are commercially available as e.g. GENUTINE™ type X-8300, X-8302, and X-9303 from Hercules Copenhagen, Denmark, or GENU-
GEL™ type WR-713 or X-8605, likewise available from Hercules Copenhagen.

While the above carrageenans are the preferred ones, it must be understood that the invention is not limited thereto. Thus, any carrageenan component, which will provide the required gelling capability, may be employed in a food composition according to the present invention. More particularly, a carrageenan component in a non-purified form, such as in the form of seaweed, particularly red seaweeds, may also be employed.

Further, one or more additional hydrocolloids may be employed in combination with the above disclosed carrageenans to provide a particular gelling property, such as pectin, e.g. GENU™ Pectin, available from Hercules Copenhagen, agar-agar, e.g. GENU™ Agar, available from Hercules Copenhagen, cellulose, such as AVICEL™, cellulose extracts and derivatives such as carboxy methyl cellulose (CMC), e.g. Blanose cellulose gum, methyl cellulose, e.g. Benecel™, hydroxy propyl cellulose, e.g. Klucel, hydroxy propyl methyl cellulose and mixtures thereof, starch, such as Avebe™ Perfectagel MPT, Avebe™ Perfectagel 928 and Avebe™ Perfectamyl Gel MB, alginates, xanthans such as Keltrol or Kelgum from Kelco Biopolymers, curd-lan, gelatine, guar, locust bean gum, tara gum, karaya gum, gellan gum such as Kelcogel from Kelco Biopolymers, furcellaran, tragacanth, and gum arabic, generally in an amount of up to about 10% by weight.

The present invention also provides the use of a carrageenan component for gelling a food composition of a soluble solids content of about 50 to about 90% by weight, at least 70% by weight thereof being a sweetening system comprising sucrose and non sucrose sweeteners in a weight ratio of sucrose to non sucrose sweeteners of 0:100 to 95:5, wherein the non sucrose sweetener is of a DE of at least about 30, and wherein the gelation temperature of said composition determined as the intersection of the graphs of elastic modulus, G' , and viscous modulus, G'' , measured on a Haake Rheometer, RS 100 using the settings - Gradient $1^{\circ}\text{C}/\text{min}$, $0,4640\text{ Hz}$, $95^{\circ}\text{C} - 65^{\circ}\text{C}$, $t=1800\text{ s}$, $0,50\text{ Pa}$, $65^{\circ}\text{C} - 35^{\circ}\text{C}$, $t=1800\text{ s}$, $2,50\text{ Pa}$ - Stress sweep 35°C $0,10\text{ Pa} - 20,00\text{ Pa}$, $0,4640\text{ Hz}$, is below 95°C . The carrageenan component is preferably an iota carrageenan or a kappa carrageenan or mixtures thereof.

Thus, a vegetable alternative to gelatine has been provided giving a product of a similar texture as gelatine gelled products and which allows the preparation of food compositions of high soluble solids content in a cost and energy efficient, industrially applicable process.

Examples

In the examples given below the following apparatus and chemicals have been used to prepare and test food compositions according to the invention:

Apparatus:

- Texture Analyzer, TA-XT2. 5 kg. Software Texture ExpertTM, manufactured by Stable Micro Systems, England.

Chemicals:

- Sucrose, food grade, Danisco A/S, Denmark

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- Citric acid, monohydrated, MERCK in 50% w/v solution
- Tri-sodium citrate, $2\text{H}_2\text{O}$, MERCK
- GENUTINE™ types X-8302, X-8300, and X-9303 carrageenan, Hercules

Example 6.1Preparation of an aerated food composition (marshmallows)

Aerated confectioneries (marshmallows) were produced according to the following table:

Table III

Component	Ingredients	% SS	(g)	(g) SS
A	Water	-	16.00	-
	Sucrose	100	46.00	46.00
	Glucose syrup (DE-39)	84	18.00	15.12
	Invert syrup	75	19.00	14.25
B	Water	-	13.50	-
	GENUTINE™ type X-8300	100	1.12	1.12
	GENU™ Agar type 900-A1	100	0.45	0.45
C	Water	-	6.50	-
	Icing sugar	100	3.00	3.00
	Hyfoama™ DSN	100	0.40	0.40
D	Flavour and colour		Optional	
	Evaporation		23.97	
	Yield		100.00	
	Yield soluble solids			80.34

A sugar syrup is prepared by mixing the components (A) and heating to the boiling point. Separately a dispersion of carrageenan and a further hydrocolloid in the form of GENU™ type 900-A1 agar is dispersed in 90° C water (Component B) while stirring with a high speed mixer for two minutes. Component (B) is added to component (A) and boiled to 86% of soluble solids. Separately therefrom the ingredients of component (C) are mixed and beaten to a stiff foam.

The mixture of component (A) and (B) is slowly added to component (C) while whipping and beating for about three minutes at high speed.

Thereupon, optional flavour and colour are added, and the slurry is deposited immediately in a hot state in a manner analogous to example 1.1.

Example 7.1

Preparation of a high sugar glazing

A high sugar glazing was produced according to the following table.

Table IV

Component	Ingredients	% SS	(g)	(g) SS
A	GENUGEL™ type X-8605 carrageenan	100	0.4	0.4
	Sucrose	100	4.0	4.0
	Tri-sodium citrate	100	0.6	0.6
B	Water	-	18.0	-
C	Sucrose	100	20.0	20.0
D	Glucose syrup**	80	60.0	48.0
E	Potassium sorbate 20% w/v	20	0.5	0.1
F	Citric acid 50% w/v	50	1.4	0.7
	Evaporation		4.9	
	Yield		100.0	
	Yield soluble solids			74.0

** Cerestar FT 01700.

- 10 The ingredients of Component (A) are dry-blended and dispersed in component (B) and heated to boiling to dissolve the carrageenan. Component (C) is added while heating, whereupon Component (D) is mixed thereto under continued heating. The heating is continued to obtain a soluble solids content in the range of 73 to 75%, whereupon Component (E) as a preservative and Component (F) as a buffer is added.
- 15 The composition is deposited as disclosed in example 1.1.

The texture of the above food composition is short, creamy and very transparent. It can be melted without dilution by heating to 60 to 70° C. However, it may also be diluted by about 20% of water to obtain a glazing suitable for fruit and ice cream tarts.

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Examples 7.2 to 7.4

Further glazing compositions were produced analogously with the above disclosed procedure. The recipes used appear from the below table V.

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Table V

Component	Ingredients	Ex. 7.2				Ex. 7.3				Ex. 7.4			
		% SS	(g)	(g) SS	% SS	(g)	(g) SS	% SS	(g)	% SS	(g)	(g) SS	(g) SS
A	GENUGEL™ type X-8605	100	0.4	0.4	100	0.4	0.4	100	0.4	100	0.4	0.4	0.4
	carrageenan												
	Sucrose	100	4.0	4.0	100	4.0	4.0	100	4.0	100	4.0	4.0	4.0
	Tri-sodium citrate	100	0.6	0.6	100	0.6	0.6	100	0.6	100	0.6	0.6	0.6
B	Water	-	20.0	-	-	17.0	-	-	17.0	-	15.0	-	-
	Sucrose	10.0	17.0	17.0	100	22.0	22.0	100	22.0	100	27.0	27.0	27.0
C	Glucose syrup*	80	60.0	48.0	80	60.0	48.0	80	60.0	80	60.0	48.0	48.0
	Citric acid 50% w/v	50	1.4	0.7	50	1.4	0.7	50	1.4	50	1.4	0.7	0.7
D	Evaporation		3.4			5.4			8.4		8.4		
	Yield		100.0			100			100		100		
	Yield soluble solids		70.7				75.7					80.7	80.7

* CERESTAR FT 01700

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The texture of the products of ex. 7.2 to 7.4 is pleasantly soft, creamy and short.

Test results of the above compositions appear from the table VII below.

Experimental results

Measurement methods:

- 5 Texture, pH and content of soluble solids are determined as follows:

Texture

- The textures of the deposited samples are characterised by the following parameters:
Break strength (BS) (in grams of force), at 5°C, Gel strength (in grams of force), at 5°C at a 2 mm, 4mm, and 8 mm compression distance, and Distance to break (DT) at 5° C; which parameters are measured with a Texture Analyzer on test samples deposited in Bloom glasses.
- 10

Bloom glasses: Pyrex™ glass cylinders of a diameter of 700 mm and a height of 40 mm, available from Bibby Sterilin Ltd., Stone, Staffordshire, Great Britain.

Break strength.

- 15 The Break strength (BS) is determined as the force (in grams) required to compress the sample to break with a 0.5" (1.25 cm) diameter probe.

Gel strength.

The Gel strength is determined as the force (in grams) required to compress the gel 2, 4, and 8 mm, respectively, with a 0.5" (1.25 cm) diameter probe.

Distance to break.

The Distance to-break (DT, Distance Travelled) is determined as the distance (in mm) it takes to break the gel.

In these experiments the probe speed is 1 mm/sec.

5 *Refractometer.*

Part of the gel from one of the Bloom glasses is used for measurement of soluble solids in a refractometer, available from Bellingham & Stanley Ltd., Great Britain, covering the range 40 to 80% SS or 75 to 93% SS.

Depositing temperature.

- 10 Said temperature is measured with a thermometer placed in the centre of a depository funnel. The depositing temperature is read as the temperature just before the material is non-flowable.

Gelation temperature.

- 15 The gelation temperature, T_{gel} , is the temperature at which the gel-forming process initiates. It is determined as the intersection of the graphs of elastic modulus, G' , and viscous modulus, G'' , respectively.

Rheological measurements: Rheological measurements to determine the elastic modulus, G' , the viscous modulus, G'' , as well as the viscosity versus temperature were performed using a Haake Rheometer, RS100, Rheostress, Haake, Germany.

- 20 Measurements were performed using the following settings:

-Gradient 1°C/min, 0,4640 Hz

95°C-65°C, $t=1800$ s, 0,50 Pa

65°C-35°C, $t=1800$ s, 2,50 Pa

-Stress sweep 35°C

0,10 Pa-20;00 Pa, 0,4640 Hz

Springiness.

Springiness is a measure of the ability of the sample to regain its original shape after
 5 compression. The sample is placed under a cylinder probe, avoiding any irregular or
 non-representative areas. The probe then compresses the sample until it has com-
 pressed 20% of the product height. The probe holds this position for 60 seconds and
 then withdraws from the sample and returns to its starting position. The force on the
 probe after 60 seconds at the 20%-position is recorded (F 60). % springiness is
 10 calculated from the expression:

$$\% \text{ springiness} = \frac{F_{60}}{F_0} \times 100\%$$

wherein F_0 is the force measured after 0 seconds.

Test results for examples 1.1 to 4.4 and 7.2 to 7.4 appear from the below Tables VI
 15 and VII, respectively.

Table VI

Test results for examples 1.1 to 4.4, soft candies (wine gums)

	Ex. 1.1	Ex. 1.2	Ex. 2.1	Ex. 2.2
% SS (calculated)	60	70	60	70
Sucrose:Non sucrose	60:40	60:40	20:80	20:80
DE of non sucrose	~DE 60	~DE 60	DE 60	DE 60
TA,XT2 measurements in Bloom glasses				
Gel strength	2 mm (g)	6.7	6.8	6.9
	4 mm (g)	15.3	16.2	16.3
	8 mm (g)	40.0	41.2	41.0
BS (g)	739	873	660	830
DT (mm)	29.6	29.8	29.3	30.0
Depositing temperature (°C)	74-76	84-86	76-78	84-86
pH	3.8	3.8	3.8	3.9
% SS (measured)	60.0	70.0	60.0	67.0

Table VI (cont.)

TA,XT2 measurements in Bloom glasses								
	Ex. 3.1	Ex. 3.2	Ex. 3.3	Ex. 4.1	Ex. 4.2	Ex. 4.3	Ex. 4.4	
% SS (calculated)	60	70	80	60	70	80	"	85
Sucrose:Non sucrose	20:80	20:80	20:80	20:80	20:80	20:80		20:80
DE of non sucrose	DE 95	DE 95	DE 95	DE 60	DE 60	DE 60		DE 60
Gel strength	2 mm (g)	9.3	8.1	8.8	298	347	194	118
	4 mm (g)	18.8	17.6	19.2	623	706	546	379
	8 mm (g)	44.1	42.8	45.2	254	395	1335	1234
BS (g)	453	555	714	417	534	1403		2140
DT (mm)	26.4	27.1	30.0	27.4	29.2	9.1		14.1
Depositing temperature (°C)	67-69	74-76	86-88	53	63	86		76
pH	3.8	3.8	3.7	3.9	4.0	4.0		4.0
% SS (measured)	57.0	68.0	79.0	65.0	68.0	79.0		83.0

Table VII

Test results for examples 7.2 to 7.4, glazings

		Ex. 7.2	Ex. 7.3	Ex. 7.4
% SS		70.7	75.7	80.7
Sucrose:Non sucrose		30:70	35:65	40:60
DE of non sucrose		62	62	62
TA.XT2 measurements in Bloom glasses				
Gel strength	2 mm (g)	93	93	35
	4 mm (g)	185	238	112
	8 mm (g)	181	239	333
BS (g)		274	347	444

Example 8

- 10 Further test results were obtained, in which gelled soft candies (wine gums) were prepared essentially as described in the above examples 1.1. to 4.4, using GENUTINE™ X-9303 carrageenan at a fixed amount of 2.5%, but varying the weight ratios of sucrose and non-sucrose sweeteners, the DE values of the non sucrose sweetener, and the % SS values.
- 15 The characteristics of the different preparations were then determined, and the test results are listed in Table VIII below. Also, the corresponding data (G' , G'' , and viscosity) are shown in Figs 1.1 to 1.9.

Viscosity (mPa's), elastic modulus G' (Pa), and viscous modulus G'' (Pa) were plotted as a function of the temperature in Figs 1.1-1.9. The data were obtained,

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using a Haake rheometer.

The gelation temperature of each composition is read from each of the Figs 1.1 to 1.9 as the temperature at which the respective G' curve and the G'' curve intersects.

All the compositions tested resulted in gelation temperatures below 95° C, water activities above 0.65 and springiness values above 30 (Table VIII).

Table VIII

Ex. No	Use level	Carrageenan	Gelation temp. (°C)	Deposit temp.	Viscosity at 95 °C	Syrup: sugar	Syrup type	DE	% Soluble solids	Aw	Springiness %
8.1	2.5	GENUTINE™ X-9303	81.1	75	2788	4:1	HM 70	DE 54	79(81)	0.705	48.1
8.2	2.5	GENUTINE™ X-9303	71.3	71	1455	2:1	HM 70	DE 54	76		49.4
8.3	2.5	GENUTINE™ X-9303	80.0	76	3293	2:1	Igos	DE 40	76		44
8.4	2.5	GENUTINE™ X-9303	74.2	70	974	2:1	Igos	DE 40	74		
8.5	2.5	GENUTINE™ X-9303	73.5	71	796	2:1	HM 70	DE 54	73		
8.6	2.5	GENUTINE™ X-9303	89.7	87	9699	4:1	Igos	DE 40	79.5	0.711	38.7
8.7	2.5	GENUTINE™ X-9303	78.3	80	2019	4:1	HM 70	DE 54	76	0.724	41.2
8.8	2.5	GENUTINE™ X-9303	85.5	81	3862	5:95	HM 70	DE 54	78.5	0.673	31.1
8.9	2.5	GENUTINE™ X-9303	81.4	77	3212	100:0	HM 70	DE 54	79	0.718	52.6

it appears, all formulations tested gave satisfactory results in terms of gelation temperatures well below 95°C, and a springiness in the order 40-50 %.

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Example 9

US 5,607,716 discloses a low fat confectionery gelled by the use of carrageenan. The confectionery according to US 5,607,716, however, does not possess the desired characteristics according to the present invention in terms of gelation temperature, ease of handling, and springiness.

In order to further verify this, tests were performed comparing compositions prepared according to the recipes of examples 6 and 8 of the US 5,607,716 patent.

The type of carrageenan used in this comparative test was GENUTINE™ X-9303 and the results are shown in table X and Fig 2 below, wherefrom the gelation temperature (intersection point of the G' and G'' curves) is obtained.

The compositions were:

- I. Composition prepared according to example 6 of US 5,607,716, however using 0.2% GENUTINE™ X-9303, and 87% SS.
- II. Composition prepared according to example 8 of US 5,607,716, however using 0.6% GENUTINE™ X-9303, and 89% SS.
- III. Composition prepared according to example 6 of US 5,607,716, increasing the amount of GENUTINE™ X-9303 to 2.5%, the amount presently preferred according to the present invention, and reducing the SS content to 75%.
- IV. Composition prepared according to example 8 of US 5,607,716, increasing the amount of GENUTINE™ X-9303 to 2.5% and reducing the SS content to 75%.
- V. Composition prepared according to the present invention containing 2.5%

GENUTINE™ X-9303, 79% SS, a sucrose:non sucrose ratio of 1:4, and a DE 54 of the non-sucrose sweetener.

VI. Composition prepared as in V with 5% evaporated skim milk added.

For details on the composition, see Table IX below. The results obtained are given in

5 Table X.

Table IX

Ingredients / Sample	I	II	III	V	VI
Evaporated Skim Milk	36.55	34.86	31.71		6.39
Di-sodium phosphate	0.06	0.01	0.06		
10 Tri-sodium citrate				0.46	0.46
High Fructose syrup, 55% fructose	61.04	58.24	52.98		
High Maltose syrup, Cargill HM70				68.81	63.25
15 Sugar				13.76	13.80
Butter		4.00			
Butter flavour	0.15		0.15		
AVICEL GP 3252	1.00	1.00	1.00		
Water		0.30	10.60	13.76	13.80
20 GENUTINE™ X-9303	0.20	0.60	2.50	2.29	2.30
NaCl	0.50	0.50	0.50		
Lecithin	0.20	0.19	0.20		
K-2000 (mono- and diglycerides)	0.30	0.30	0.30		
25 Citric acid (50% w/v solution)				0.92	
Total	100.00	100.00	100.00	100.00	100.00

Table X

Composi- tion	Appearance	Deposition- able	Gelation temp. (°C)	Viscosity at 95° C	Springiness
I	Thick, uneven	Yes	> 95	~ 20.000	< 10
II	Very thick, uneven	No	> 95	~ 100.000	< 15
III	Thick, very uneven, inhomoge- neous	No	> 95	> 100.000	28
*IV	-	-	-	-	-
V	Thin, even, homoge- neous	Yes	81	~ 2.800	48
VI	Even, homoge- neous	Yes	90	~ 10.000	35

10 *This composition was not possible to make.

This test shows (Table X) that the recipe given in Examples 6 and 8 of US 5,607,716 will not result in a composition with the desired gelation temperature below 95° C, neither if the carrageenan is used in 0.2 to 0.6% amounts (see I and II), nor if the amount is increased to 2.5% (see III and IV). Only the sweetening system used accord-
 15 ing to this invention (see V and VI) will result in a product with the desired characteris-
 tics.

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It is evident from the above results that the composition according to the invention (V) has the desired gelation temperature below 95° C, is easier to work with and has more springy characteristics.

5 The above description of the invention reveals that it is obvious that it can be varied in many ways. Such variations are not to be considered a deviation from the scope of the invention, and all such modifications which are obvious to persons skilled in the art are also to be considered comprised by the scope of the succeeding claims.

Claims

1. A food composition comprising soluble solids in the range of about 50% to about 90% by weight, at least 70% by weight thereof being a sweetening system comprising sucrose and non sucrose sweeteners in a weight ratio of sucrose to non sucrose sweeteners of 0:100 to 95:5, wherein the non sucrose sweetener is of a DE (Dextrose Equivalent) of at least about 30, a carrageenan component in an amount sufficient to form a gel, and water to balance, and wherein the gelation temperature, determined as the intersection of the graphs of elastic modulus, G' , and viscous modulus, G'' , measured on a Haake Rheometer, RS 100 using the settings - Gradient $1^{\circ}\text{C}/\text{min}$, 0,4640 Hz, $95^{\circ}\text{C} - 65^{\circ}\text{C}$, $t=1800\text{ s}$, 0,50 Pa, $65^{\circ}\text{C} - 35^{\circ}\text{C}$, $t=1800\text{ s}$, 2,50 Pa - Stress sweep 35°C 0,10 Pa- 20,00 Pa, 0,4640 Hz, of said food composition is $< 95^{\circ}\text{C}$.
2. The composition according to claim 1, wherein said non sucrose sweetener is a hydrogenated starch hydrolysate syrup of a DE of at least about 30, preferably a DE > 30 fructose or glucose syrup.
3. The composition according to claim 1, wherein said non sucrose sweetener is a hydrogenated starch hydrolysate syrup of a DE of least about 40, preferably a DE > 40 fructose or glucose syrup.
4. The composition according to claim 1, wherein said non sucrose sweetener is a hydrogenated starch hydrolysate syrup with a DE in the range of about 40 to about 100, particularly preferred about 50 to 90, especially about 60 to 70.
5. The composition according to claim 4, wherein said non sucrose sweetener is a high maltose glucose syrup, particularly a high maltose glucose syrup of a DE of about 50 to 60.

6. The composition according to claim 1, wherein the sucrose can be replaced wholly or partly by an aqueous solution of a sugar alcohol.
7. The composition according to claim 6, wherein said sugar alcohol is selected among sorbitol, mannitol, xylitol, isomalt, lactitol, maltitol or a maltitol syrup.
- 5 8. The composition according to any one of the claims 1 to 7, wherein the ratio of sucrose to non sucrose sweetener is from about 10:90 to about 70:30, preferably from about 20:80 to about 30:70, particularly preferred about 1:2.
9. The composition according to claim 1, wherein the soluble solids thereof is in the range of 70 to 85% by weight, particularly preferred about 75 to 80% by weight.
- 10 10. The composition according to claim 1, wherein the gelation temperature of said food composition is less than 85° C, preferably less than 80° C.
11. The food composition according to claim 1, wherein at least about 80%, preferably at least about 90% of the soluble solids are comprised by said sweetening system.
- 15 12. The composition according to claim 1, wherein said carrageenan component is an iota carrageenan or a kappa carrageenan or mixtures thereof.
13. The composition according to claim 12, wherein said carrageenan is present in an amount of about 0.25 to 10.0% by weight, preferably about 0.75 to 5.0%, especially about 1 to 3% by weight of the food composition.
- 20 14. The composition according to claim 1 further comprising as additional gelling agent a hydrocolloid selected from the group comprising pectin, agar-agar, alginates, carboxy methyl cellulose, methyl cellulose, hydroxy propyl cellulose,

curdlan, xanthans, gelatine, starch and gum arabic in an amount of up to about 10.0% by weight of the food composition.

15. The composition according to claim 1, wherein said soluble solids further comprise one or more ingredients selected among milk solids, vitamins, minerals,
5 food grade acids and salts thereof, flavourings, colourings, artificial sweeteners, preservatives and bulking agents.

16. The composition according to claim 1, wherein said food composition is a high sugar confectionery.

17. The composition according to claim 16, wherein said food composition
10 is soft candies or wine gum.

18. The composition according to claim 1, wherein said composition is an aerated confectionery and further comprises a whipping agent.

19. The composition according to claim 1, wherein said composition is a glazing.

15 20. A process for producing a food composition according to claim 1 comprising (a) dispersing carrageenan in a syrup of a non sucrose sweetener at a temperature sufficient to disperse the carrageenan in said syrup while stirring, (b) adding water and heating the mixture to the boiling point thereof, (c) adjusting the soluble solids content to from about 50% to about 90% by weight, (d) depositing said mixture and
20 (e) cooling said mixture to below the depositing temperature of said mixture.

21. The process according to claim 20, wherein sucrose, if any, is added in step (c).

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22. The process according to any one of the claims 20 to 21, wherein the temperature sufficient to disperse the carrageenan in the syrup of the non sucrose sweetener is at least about 50, especially at least about 60° C.
23. The process of any one of the claims 20 to 22, wherein one or more ingredients selected among milk solids, vitamins, minerals, food grade acids, flavourings, colourings, artificial sweeteners, preservatives and bulking agents is (are) added between steps (c) and (d).
24. The process according to any one of the claims 20 to 23, wherein in step (d) said hot mixture is deposited in moulds.
25. A use of a carrageenan component for gelling a food composition of a soluble solids content of about 50 to about 90% by weight, at least 70% by weight thereof being a sweetening system comprising sucrose and non sucrose sweeteners in a weight ratio of sucrose to non sucrose sweeteners of 0:100 to 95:5, wherein the non sucrose sweetener is of a DE of at least about 30, and wherein the gelation temperature of said food composition, determined as the intersection of the graphs of elastic modulus, G' , and viscous modulus, G'' , measured on a Haake Rheometer, RS 100 using the settings - Gradient 1 °C/min, 0,4640 Hz, 95°C - 65°C, $t=1800$ s, 0,50 Pa, 65°C - 35°C, $t=1800$ s, 2,50 Pa - Stress sweep 35 °C 0,10 Pa- 20,00 Pa, 0,4640 Hz, is < 95° C.
26. The use according to claim 25, wherein said carrageenan is an iota carrageenan or a kappa carrageenan or mixtures thereof.

09/926475

JC17 Rec'd PCT/PTO 09 NOV 2001

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Att: Ms. Judith Graham

VIA TELEFAX NO. 0049 89 2399 4465

2 August 2001

Dear Ms. Graham

PCT-application No. PCT/DK00/00252
Applicant: Hercules Incorporated
My ref: 72201 UCK/Sp

With reference to our telephone conversation of 1 August 2001 I hereby transmit a new set of claims amended as agreed upon during said telephone conversation.

Thus, claims 1 and 25 have been clarified by adding the settings used for the rheology measurements. Furthermore, claims 1 and 25 have been amended to specify that the DE of the non-sucrose sweetener is at least 30, the limitation to a DE of at least 50 being unnecessary. In view hereof, former subclaims 2 - 4 have been reintroduced and the remaining claims have been renumbered.

Corresponding amendments have been made in the description.

Finally, I can inform you that in the comparative examples forwarded with my reply to the Written Opinion dated 4 May 2001 the same settings of the rheology measurements as used in the application were applied.

Yours faithfully
CHAS. HUDE A/S

Ulla C. Klinge
Representative of the Applicant

Encs:
amended claims
draft showing amendments in the description

Claims

1. A food composition comprising soluble solids in the range of about 50% to about 90% by weight, at least 70% by weight thereof being a sweetening system comprising sucrose and non sucrose sweeteners in a weight ratio of sucrose to non sucrose sweeteners of 0:100 to 95:5, wherein the non sucrose sweetener is of a DE (Dextrose Equivalent) of at least about 30, a carrageenan component in an amount sufficient to form a gel, and water to balance, and wherein the gelation temperature, determined as the intersection of the graphs of elastic modulus, G' , and viscous modulus, G'' , measured on a Haake Rheometer, RS 100 using the settings - Gradient $1^{\circ}\text{C}/\text{min}$, 0,4640 Hz, $95^{\circ}\text{C} - 65^{\circ}\text{C}$, $t=1800\text{ s}$, 0,50 Pa, $65^{\circ}\text{C} - 35^{\circ}\text{C}$, $t=1800\text{ s}$, 2,50 Pa - Stress sweep 35°C 0,10 Pa- 20,00 Pa, 0,4640 Hz, of said food composition is $< 95^{\circ}\text{C}$.
2. The composition according to claim 1, wherein said non sucrose sweetener is a hydrogenated starch hydrolysate syrup of a DE of at least about 30, preferably a DE > 30 fructose or glucose syrup.
3. The composition according to claim 1, wherein said non sucrose sweetener is a hydrogenated starch hydrolysate syrup of a DE of least about 40, preferably a DE > 40 fructose or glucose syrup.
4. The composition according to claim 1, wherein said non sucrose sweetener is a hydrogenated starch hydrolysate syrup with a DE in the range of about 40 to about 100, particularly preferred about 50 to 90, especially about 60 to 70.
5. The composition according to claim 4, wherein said non sucrose sweetener is a high maltose glucose syrup, particularly a high maltose glucose syrup of a DE of about 50 to 60.

6. The composition according to claim 1, wherein the sucrose can be replaced wholly or partly by an aqueous solution of a sugar alcohol.
7. The composition according to claim 6, wherein said sugar alcohol is selected among sorbitol, mannitol, xylitol, isomalt, lactitol, maltitol or a maltitol syrup.
- 5 8. The composition according to any one of the claims 1 to 7, wherein the ratio of sucrose to non sucrose sweetener is from about 10:90 to about 70:30, preferably from about 20:80 to about 30:70, particularly preferred about 1:2.
9. The composition according to claim 1, wherein the soluble solids thereof is in the range of 70 to 85% by weight, particularly preferred about 75 to 80% by weight.
- 10 10. The composition according to claim 1, wherein the gelation temperature of said food composition is less than 85° C, preferably less than 80° C.
11. The food composition according to claim 1, wherein at least about 80%, preferably at least about 90% of the soluble solids are comprised by said sweetening system.
- 15 12. The composition according to claim 1, wherein said carrageenan component is an iota carrageenan or a kappa carrageenan or mixtures thereof.
13. The composition according to claim 12, wherein said carrageenan is present in an amount of about 0.25 to 10.0% by weight, preferably about 0.75 to 5.0%, especially about 1 to 3% by weight of the food composition.
- 20 14. The composition according to claim 1 further comprising as additional gelling agent a hydrocolloid selected from the group comprising pectin, agar-agar, alginates, carboxy methyl cellulose, methyl cellulose, hydroxy propyl cellulose,

curdlan, xanthans, gelatine, starch and gum arabic in an amount of up to about 10.0% by weight of the food composition.

15. The composition according to claim 1, wherein said soluble solids further comprise one or more ingredients selected among milk solids, vitamins, minerals,
5 food grade acids and salts thereof, flavourings, colourings, artificial sweeteners, preservatives and bulking agents.

16. The composition according to claim 1, wherein said food composition is a high sugar confectionery.

17. The composition according to claim 16, wherein said food composition
10 is soft candies or wine gum.

18. The composition according to claim 1, wherein said composition is an aerated confectionery and further comprises a whipping agent.

19. The composition according to claim 1, wherein said composition is a glazing.

15 20. A process for producing a food composition according to claim 1 comprising (a) dispersing carrageenan in a syrup of a non sucrose sweetener at a temperature sufficient to disperse the carrageenan in said syrup while stirring, (b) adding water and heating the mixture to the boiling point thereof, (c) adjusting the soluble solids content to from about 50% to about 90% by weight, (d) depositing said mixture and
20 (e) cooling said mixture to below the depositing temperature of said mixture.

21. The process according to claim 20, wherein sucrose, if any, is added in step (c).

22. The process according to any one of the claims 20 to 21, wherein the temperature sufficient to disperse the carrageenan in the syrup of the non sucrose sweetener is at least about 50, especially at least about 60° C.
23. The process of any one of the claims 20 to 22, wherein one or more ingredients selected among milk solids, vitamins, minerals, food grade acids, flavourings, colourings, artificial sweeteners, preservatives and bulking agents is (are) added between steps (c) and (d).
24. The process according to any one of the claims 20 to 23, wherein in step (d) said hot mixture is deposited in moulds.
25. A use of a carrageenan component for gelling a food composition of a soluble solids content of about 50 to about 90% by weight, at least 70% by weight thereof being a sweetening system comprising sucrose and non sucrose sweeteners in a weight ratio of sucrose to non sucrose sweeteners of 0:100 to 95:5, wherein the non sucrose sweetener is of a DE of at least about 30, and wherein the gelation temperature of said food composition, determined as the intersection of the graphs of elastic modulus, G' , and viscous modulus, G'' , measured on a Haake Rheometer, RS 100 using the settings - Gradient 1 °C/min, 0,4640 Hz, 95°C - 65°C, $t=1800$ s, 0,50 Pa, 65°C - 35°C, $t=1800$ s, 2,50 Pa - Stress sweep 35 °C 0,10 Pa- 20,00 Pa, 0,4640 Hz, is < 95° C.
26. The use according to claim 25, wherein said carrageenan is an iota carrageenan or a kappa carrageenan or mixtures thereof.

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4 May 2001

Dear Sirs

International patent application No PCT/DK00/00252
Applicant: Hercules Incorporated
My ref: 72201 UCK/MSH

COPY

I refer to the Written Opinion dated 5 February 2001 and have the following comments thereto:

Claim amendments:

Claim 1 has been restricted by the introduction of part of present claim 4 into claim 1 to limit the DE of the non sucrose sweetener to the range of about 50 to about 90, and present claims 2 and 3 have been deleted.

Present claim 6, now claim 4, has been clarified by indicating that merely the sucrose component, if any, and not the non sucrose sweeteners may be replaced wholly or partly by an aqueous solution of a sugar alcohol.

Finally the remaining claims have been renumbered.

Amendments to the specification:

The specification has been adapted to the claim amendments specified above, cf amended sheets 7, 8, 9, 10, 15, 36, and pages 22-23 have been deleted. Furthermore figures 1.3, 1.4 and 1.6 have been deleted.

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Postal cheque (giro): 500-0599
Unibank A/S. IBAN: DK4420005010120700
Bank: S.W.I.F.T.address: UNIBDKKK
Tax ID./VAT No.: DK 1293179

Prior art:

D1

US 5,607,716 (Doherty et al.), D1, example 1 discloses a caramel composition comprising 53% soluble solids, of which 84% are high fructose corn syrup, 0.45% carrageenan, and water. D1 is silent on the DE (Dextrose Equivalent) of the non sucrose sweetener employed.

The Examiner states that the "gelation temperature is a consequence of the composition, thus a value below 95°C would be obtained." This is, however, not correct.

The applicant has repeated example 1 of D1 (regular caramel), cf. Appendix I.

As it appears from the enclosed photographs from the production process, the viscosity of the caramel composition is adequately low at 116°C. However, upon cooling to 95°C the viscosity increases excessively and the composition cannot be deposited in moulds at 95°C to obtain an acceptable final product.

From the enclosed graphs of the elastic modules, G' , and viscous modulus, G'' , of the composition according to example 1 of D1, cf. Appendix I (4), it furthermore appears, that said two graphs do not intersect at a temperature of $< 95^\circ\text{C}$, which means that the gelation temperature, determined as the intersection of the graphs of G' and G'' , cf page 7, lines 11-13 in the specification, is $> 95^\circ\text{C}$.

Consequently D1 does not anticipate the present invention.

D2

WO 98/20860 (FMC Corporation), D2, example 1 discloses a composition with 79.5% soluble solids, of which 98% (and NOT 84%) are sucrose and corn syrup in a weight ratio of 45:55 sucrose: corn syrup, said syrup having a DE of 43/43, carrageenan, and water.

Example 1 of D2 was repeated, cf. Appendix II.

As it appears from the enclosed photographs from the production process depositing even at a temperature of 102°C was difficult and the final product possessed an unacceptable appearance.

It furthermore appears from the enclosed graphs of G' and G'' of the composition according to example 1 in D2, cf. Appendix II (3), that there is no intersection of G' and G'' at a temperature $<95^{\circ}\text{C}$, which means that the gelation temperature of said composition is $>95^{\circ}\text{C}$.

In order to verify that the calcium carbonate component in example 1 of D2 is not the determining factor for the behaviour of the composition, example 1 of D2 was repeated, however without addition of any CaCO_3 . The result of said test is shown in Appendix III. As it appears, it was not possible to obtain an acceptable product even by depositing at 98°C .

It furthermore appears from the enclosed graphs of G' and G'' , that the gelation temperature is higher than 95°C .

Thus D2 does not anticipate the present invention.

The present inventors were thus the first to realize that by employing a sweetening system comprising sucrose and non sucrose sweeteners in a weight ratio of sucrose to non sucrose sweeteners of 0:100 to 95:5, wherein the Dextrose Equivalent (DE) of the non sucrose sweetener is about 50 to about 90, it is possible to dissolve a carrageenan component in a high solids system of about 50 to about 90% by weight of soluble solids in a minor amount of water to obtain a food composition having a gelation temperature of less than 95°C . Gelation temperatures of above 95°C are undesirable from a practical point of view, necessitating special precautions to be taken. Furthermore comparatively smaller amounts of water need to be added compared to conventional processes and consequently less energy is needed for the subsequent evaporation thereof. The present invention thus represents a substantially increased process efficiency.

Nothing in the prior art would lead the skilled man to realize which features are necessary in order to arrive at a high soluble solids system comprising a sweetening system, a carrageenan component and water having an adequately low gelation temperature.

Chas. Huide

4

The Examiner states that independent claim 20, now claim 18, is not novel in view of D1. However, according to D1 a blend of liquified corn syrup and dry sugars is prepared and heated in a first step, whereas according to the invention any sucrose in the composition is not added until after heating the syrup.

Finally independent claim 25, now claim 23, is not anticipated by D2. Thus as shown in Appendix II and contrary to the opinion of the Examiner a gelation temperature of below 95°C is not obtained by the composition of example 1 in D2.

In view of the above the Examiner is respectfully requested to acknowledge the patentability of the present invention:

Furthermore please be informed that in the measurement method disclosed on page 30 a Haake Rheometer, RS100, Rheostress was used, measurements being performed at the indicated oscillating rate of 0,4640 Hz and at a variable stress. Please let me know if any further information in this regard is needed.

Please note, however, that should the Examiner still have any objections to the claims as now set forth, the Applicant is very willing to come to an interview in order to clarify any unsettled questions.

Yours faithfully

CHAS. HUDE A/S

Ulla C Klinge
Ulla C Klinge

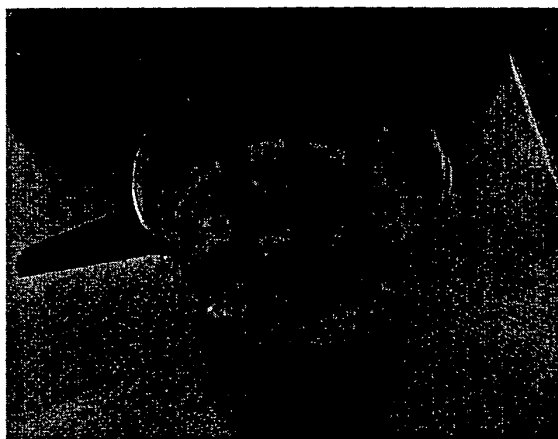
Representative of the Applicant

Encs: New copy pages 7-11, 15, and 22-38 of the specification
New copy of the claims (pages 39-42)
Draft copy of pages of the specification, claims and figures
Appendix I
Appendix II
Appendix III
EPO Form 1038

09/926475

CPKelco*Hershey patent
caramel example 1*

➤ Dissolving carrageenan in milk solids/water

www.cpkelco.com**CPKelco***Hershey patent
caramel example 1*

➤ Viscosity at 116 °C

www.cpkelco.com

09/926475

CPKelco*Hershey patent
caramel example 1*

➤ Viscosity at 100 °C

www.cpkelco.com**CPKelco***Hershey patent
caramel example 1*

➤ Viscosity at 95 °C

www.cpkelco.com

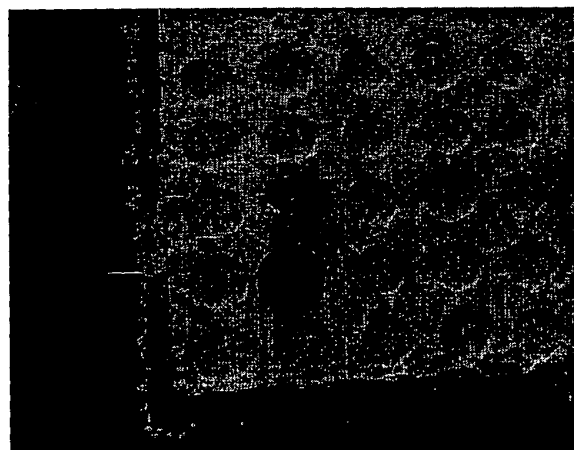
09/926475

CPKelco**Hershey patent
caramel example 1**

➤ Depositing at 95 °C in starch moulds

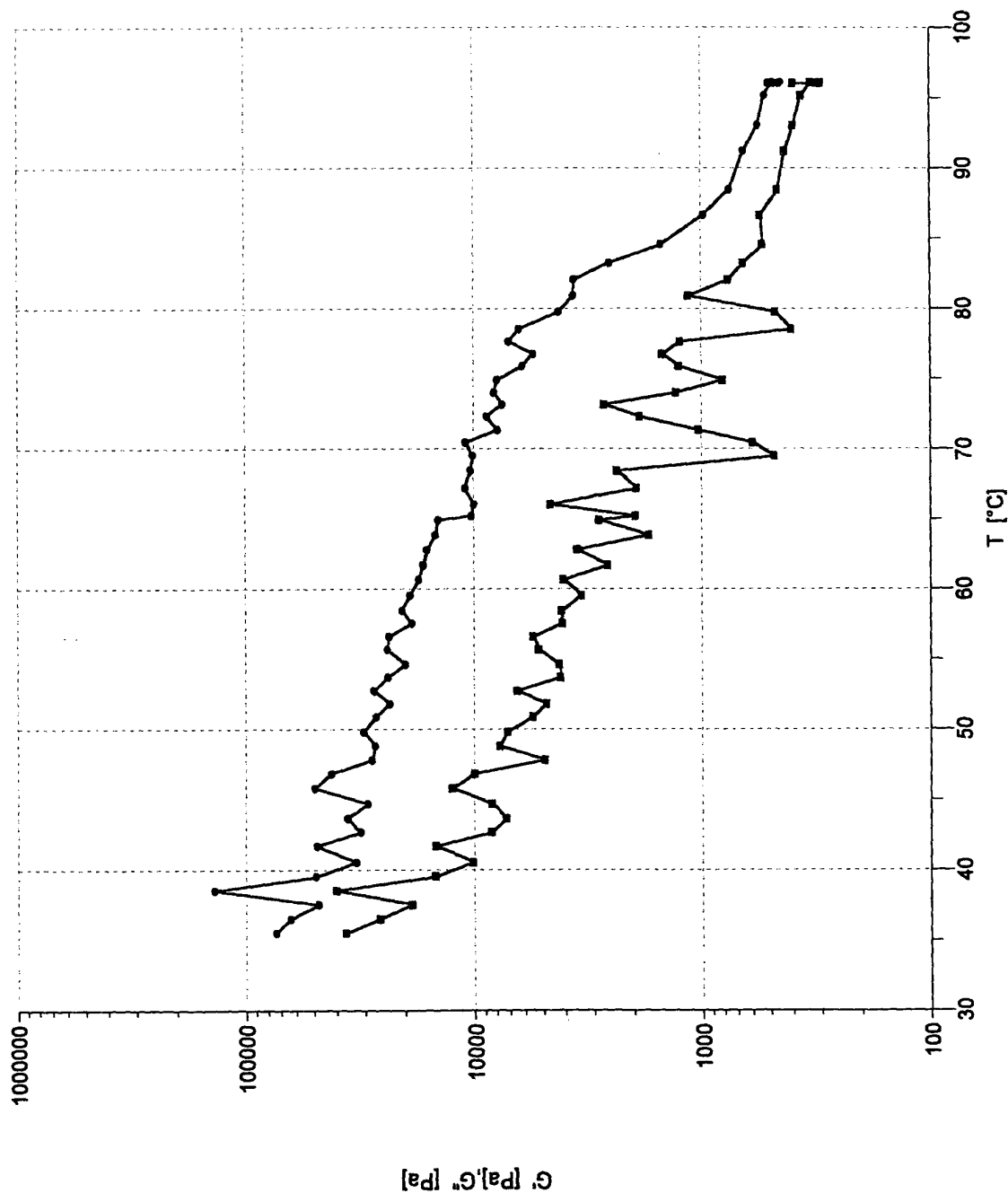
www.cpkelco.com**CPKelco****Hershey patent
caramel example 1**

➤ Final product

www.cpkelco.com

09/926475

Caramel example 1. Hershey Patent



09/926472



**Chewabl carrag nan
confection - example 1**

➤ Hydration of carrageenan in water

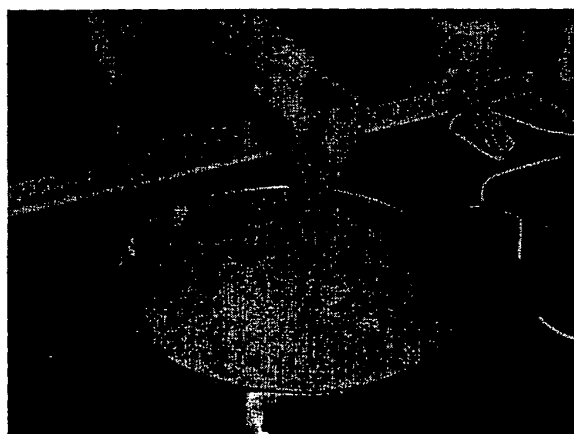


www.cpkelco.com



**Chewable carrageenan
confection - example 1**

➤ Evaporation of water to 79% solids

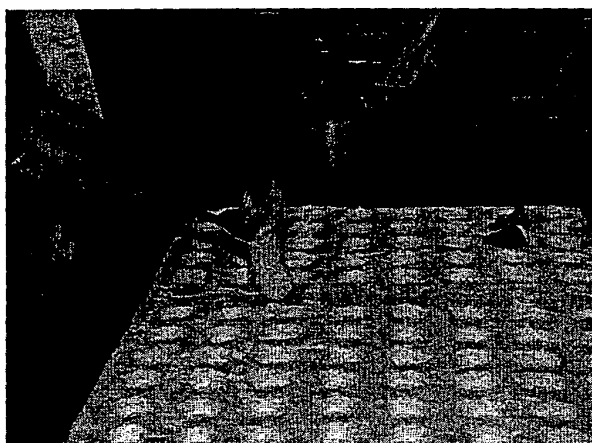


www.cpkelco.com

09/926475

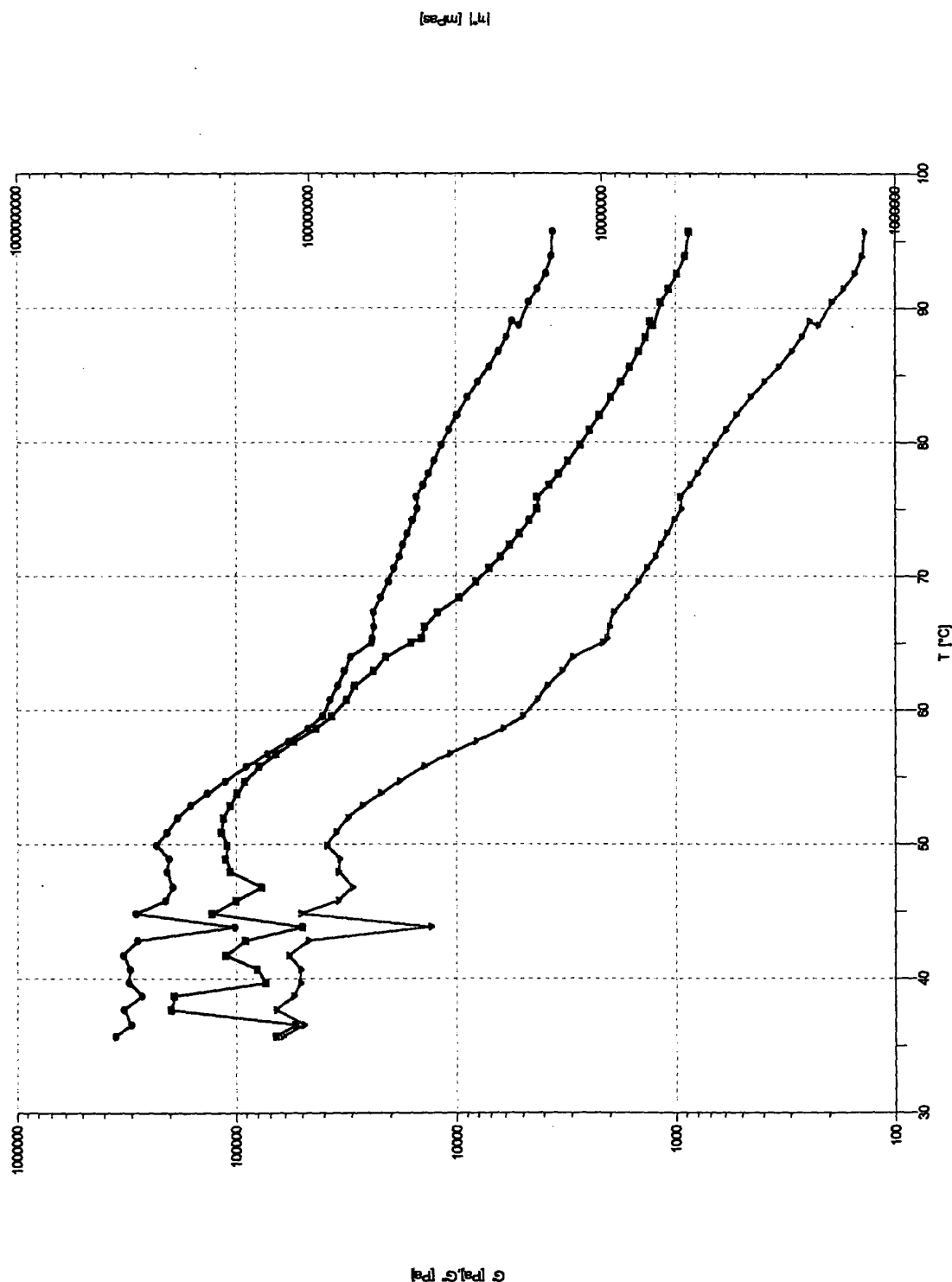
CPKelco**Ch wabl carrag enan
confection - example 1**

➤ Depositing of product at 102 °C

www.cpkelco.com**CPKelco****Chewable carrageenan
confection - example 1**

➤ Final product

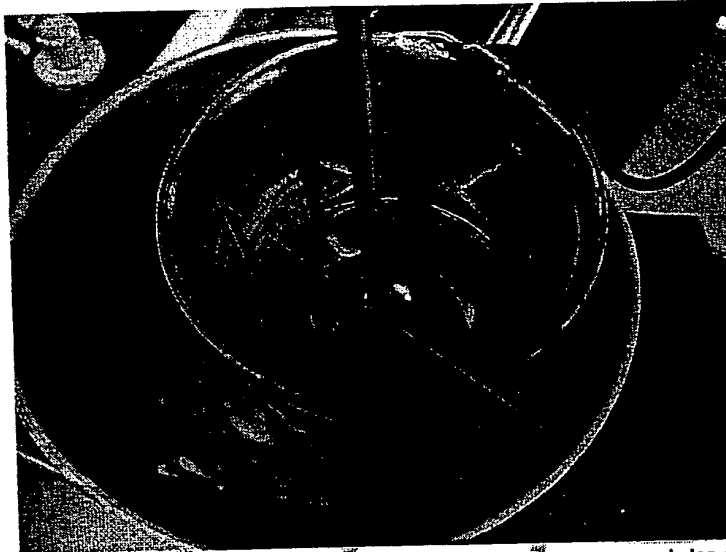
www.cpkelco.com



$G' = f(\omega)$
 $G'' = f(\omega)$
 $\omega = 2\pi f$

**Chewable carrageenan
confection - example 1**

➤ Hydration of carrageenan in water



www.cpkelco.com

09/926475

Chewable carrageenan confection - no
calcium carbonate example 1

➤ Evaporation of water to 79% solids



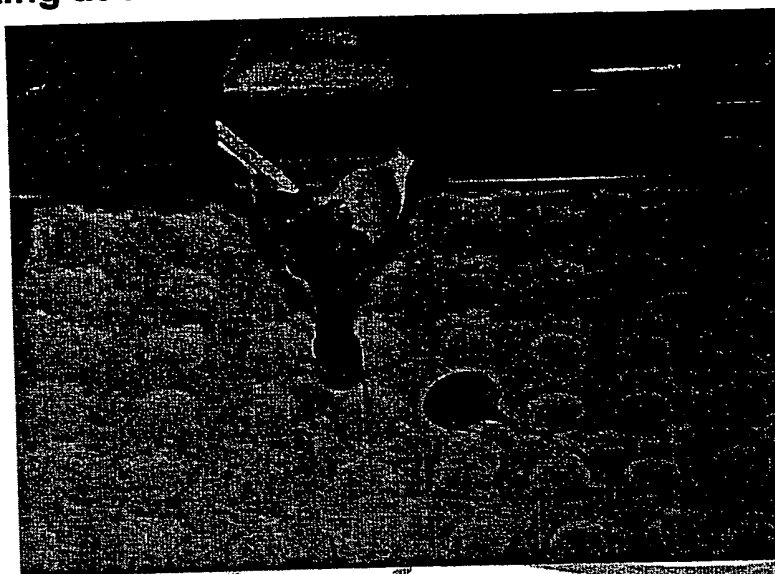
www.cpkelco.com

09/926475



*Chewable carrageenan confection - no
calcium carbonate example 1*

➤ Depositing at 98°C



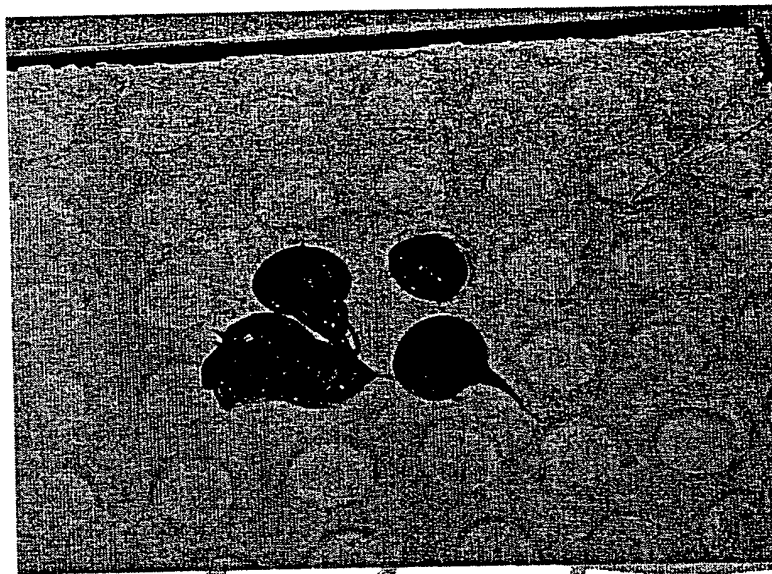
www.cpkelco.com

09/926475

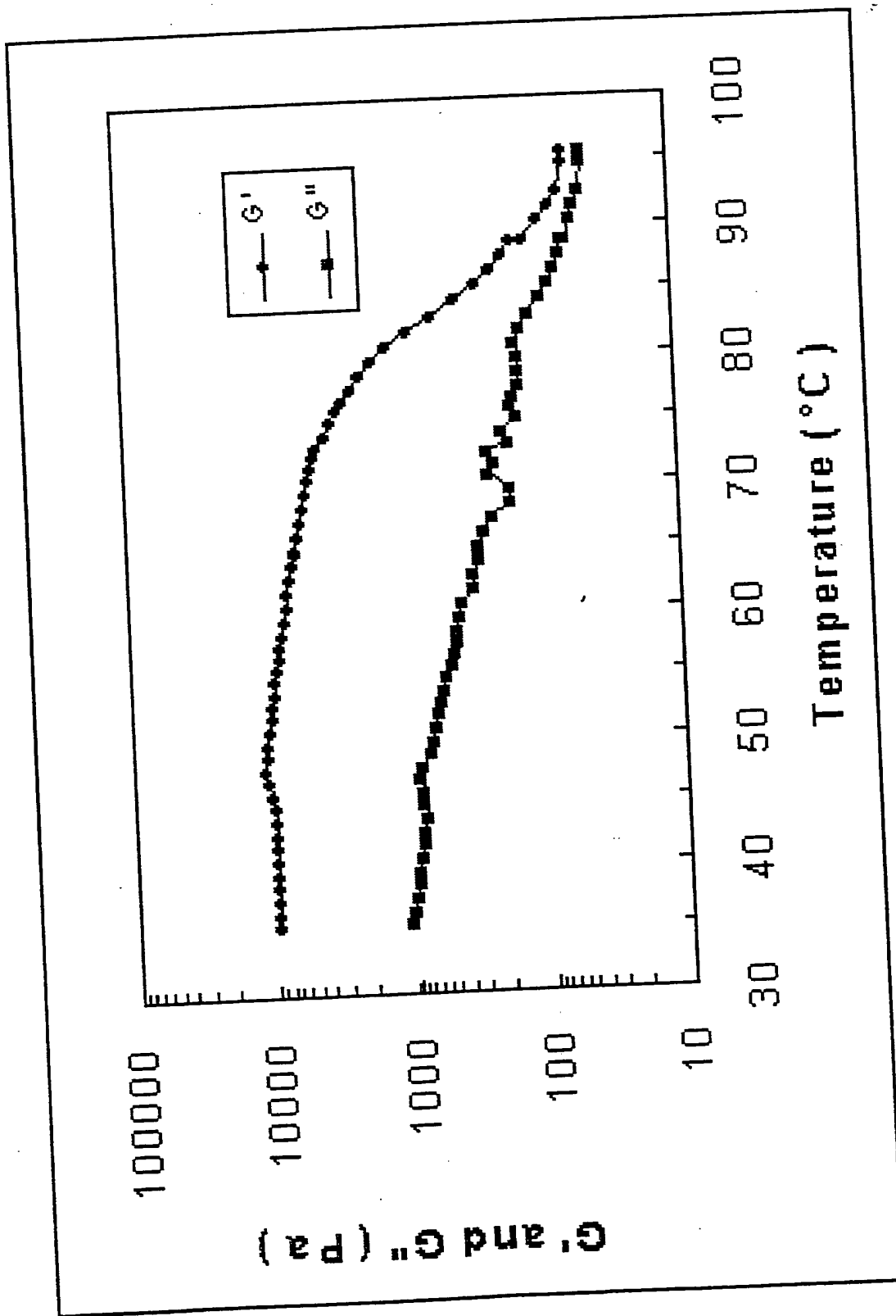


***Chewable carrageenan confection - no
calcium carbonate example 1***

➤ **Final product**



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PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

NOTIFICATION CONCERNING INFORMAL
COMMUNICATIONS WITH THE APPLICANT

(PCT Rule 66.6)


To:	
Chas. Hude A/S 33, H. C. Andersens Boulevard DK-1780 Copenhagen V <i>PR 72201 UCK</i> DANEMARK	
- 6 SEP. 2001	
<i>UCK</i>	

Date of mailing (day/month/year)	04.09.2001
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Applicant's or agent's file reference 72201 UCK/sp	TRANSMITTAL FOR INFORMATION
International application no. PCT/DK00/00252	International filing date (day/month/year) 12/05/2000
Applicant HERCULES INCORPORATED et al.	

An informal communication took place on 01/08/2001, between the International-Preliminary Examining Authority and the applicant / the agent.

A copy of the note on that communication (Form PCT/IPEA/428) is herewith transmitted for your information.

Name and mailing address of the international preliminary examining authority  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Hutterer, G Telephone No. +49 89 2399-8066
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------



PCT

Application No.:

PCT/DK00/00252

Note on an informal communication by telephone with the Applicant

A copy of this note is being sent to the Applicant for information

Participants

Applicant: Hercules Inc.

Agent: Ulla Klinge

Examiner(s): - Graham, J

Summary of the communication

3 points were discussed

1.0 the agent confirmed that the same settings for measuring G' and G'' were utilised for the comparative examples supplied in the letter of 4th May 2001.

2.0 the agent was informed that the amendment "determined by the intersection of G' and G''" were inadequate in order to be novel since the claim is broader than the description i.e. the settings must be incorporated into the claim in order for G' and G'' to have any meaning. The agent agreed and will file an amended set of claims by fax asap. The agent was informed that the deadline for the IPER is 12th August 2001.

3.0 The agent was informed that the amendment 50 - 90 DE was not acceptable since there is no basis in the application as originally filed. The 50 - 90 DE in the application as originally filed refers to starch hydrolysates and not non sucrose sweeteners which is a broader term. The agent will amend these claims to 30 DE.

Vertrag über die internationale Zusammenarbeit auf dem Gebiet des Patentswesens

Patent Cooperation Treaty
Traité de coopération internationale en matière de brevets

PCT

Application No.:

PCT/DK00/00252

01/08/2001

.....
Date (day / month / year)



Graham, J

.....
Authorized officer of IPEA

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:
Chas. Hude A/S
33, H. C. Andersens Boulevard
DK-1780 Copenhagen V
DANEMARK

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT
(PCT Rule 71.1)

Sigsynop	J.nr.	Ing.
PA	72201	UCK
- 6 SEP. 2001		

Date of mailing
(day/month/year) 04.09.2001

Applicant's or agent's file reference
72201 UCK/sp

IMPORTANT NOTIFICATION

International application No.
PCT/DK00/00252

International filing date (day/month/year)
12/05/2000

Priority date (day/month/year)
12/05/1999

Applicant
HERCULES INCORPORATED et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/

 European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized officer

Hutterer, G
Tel. +49 89 2399-8066



PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 72201 UCK/sp	FOR FURTHER ACTION		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/DK00/00252	International filing date (day/month/year) 12/05/2000	Priority date (day/month/year) 12/05/1999	
International Patent Classification (IPC) or national classification and IPC A23G1/00			
Applicant HERCULES INCORPORATED et al.			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input checked="" type="checkbox"/> Certain observations on the international application 			
Date of submission of the demand 27/11/2000		Date of completion of this report 04.09.2001	
Name and mailing address of the international preliminary examining authority: <div style="display: flex; align-items: center;"> <div> European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465 </div> </div>		Authorized officer Graham, J Telephone No. +49 89 2399 7368	



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/DK00/00252

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-6,12-14,16-21	as originally filed			
22-33,35-38	as received on	07/05/2001	with letter of	04/05/2001
7-11,15,34	with telefax of	02/08/2001		

Claims, No.:

1-26	with telefax of	02/08/2001
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Drawings, sheets:

1/10,2/10	as originally filed			
3/10-7/10	as received on	07/05/2001	with letter of	04/05/2001

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/DK00/00252

listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-26
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-26
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-26
	No:	Claims	

2. Citations and explanations
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/DK00/00252

Re Item I

Basis of the report

The amendment "determined as the intersection of the graphs of elastic modulus G' and viscous modulus G''..." in claims 1 and 25 meet the requirements of Article 34(2)(b) PCT (cf. section VIII).

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: US 5 607 716 A (CHERYL A. DOHERTY ET AL) 4 March 1997

D2: WO 98 20860 A2 (FMC CORPORATION) 22 May 1998

1.0 Novelty (Article 33(2) PCT)

1.1 The subject matter of claim 1 defines a food composition comprising 50 to 70% soluble solids, of which at least 70% comprise of sweeteners in which at least 5% are non sucrose sweeteners with a DE value of at least 30, carrageenan and water, whereby the gelation temperature determined by the intersection of the elastic and viscous modulus is below 95°C.

The subject matter of claims 1 to 19 is novel since neither D1 or D2 disclose such compositions having a gelation temperature below 95°C as determined in claim 1.

1.2 The subject matter of claims 20 to 24 is rendered novel by the fact that claim 1 is novel.

1.3 The subject matter of claims 25 to 26 is novel since neither D1 or D2 disclose the use of carrageenan for compositions having a gelation temperature below 95°C as determined in claim 25.

2.0 Inventive Step (Article 33(3) PCT)

The problem underlying the present invention is to provide a high solids gelled product

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/DK00/00252

which can be deposited under standard operating conditions i.e. having a gelation temperature below 95°C (determined by the intersection of the elastic and viscous modulus).

D1 and D2 relate to quick setting low fat confectionery with good long storage properties and low calorie aerated foods respectively.

The subject matter of claims 1 to 26 is considered as to involving an inventive step since the skilled man in the art would not use the teachings of D1 or D2 which address different technical problems.

Re Item VIII

Certain observations on the international application

The wording "stress sweep 35°C 0,10 Pa - 20,00 Pa, 0,4640 Hz" in amended claims 1 and 25 causes a lack of clarity (Article 6 PCT) since these parameters are not necessary for determining the gelation temperature by the intersection of the elastic and viscous modulus.

PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

NOTIFICATION CONCERNING
SUBMISSION OR TRANSMITTAL
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To:

CHAS. HUDE A/S
33, H.C. Andersens Boulevard
DK-1553 Copenhagen V
DANEMARK

Date of mailing (day/month/year) 28 June 2000 (28.06.00)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 72201 UCK/Ve	
International application No. PCT/DK00/00252	International filing date (day/month/year) 12 May 2000 (12.05.00)
International publication date (day/month/year) Not yet published	Priority date (day/month/year) 12 May 1999 (12.05.99)
Applicant HERCULES INCORPORATED et al	

1. The applicant is hereby notified of the date of receipt (except where the letters "NR" appear in the right-hand column) by the International Bureau of the priority document(s) relating to the earlier application(s) indicated below. Unless otherwise indicated by an asterisk appearing next to a date of receipt, or by the letters "NR", in the right-hand column, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).
2. This updates and replaces any previously issued notification concerning submission or transmittal of priority documents.
3. An asterisk(*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b). In such a case, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.
4. The letters "NR" appearing in the right-hand column denote a priority document which was not received by the International Bureau or which the applicant did not request the receiving Office to prepare and transmit to the International Bureau, as provided by Rule 17.1(a) or (b), respectively. In such a case, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

<u>Priority date</u>	<u>Priority application No.</u>	<u>Country or regional Office or PCT receiving Office</u>	<u>Date of receipt of priority document</u>
12 May 1999 (12.05.99)	PA 1999 00650	DK	05 June 2000 (05.06.00)

The International Bureau of WIPO 34, chemin des Colombettes 1211 Genève 20, Switzerland Facsimile No. (41-22) 740.14.35	Authorized officer Marie-José Devillard Telephone No. (41-22) 338.83.38
--------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

To:

CHAS. HUDE A/S
H.C. Andersens Boulevard 33
DK-1553 Copenhagen V nr.
DANEMARK

PA	72201	UCK
30 NOV. 2000		
AS 400	Til hvert SP	

Date of mailing (day/month/year) 23 November 2000 (23.11.00)		
Applicant's or agent's file reference 72201 UCK/Ve		IMPORTANT NOTICE
International application No. PCT/DK00/00252	International filing date (day/month/year) 12 May 2000 (12.05.00)	Priority date (day/month/year) 12 May 1999 (12.05.99)
Applicant HERCULES INCORPORATED et al		

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:
AG,AU,KP,KR,US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:

AE,AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,CA,CH,CN,CR,CU,CZ,DE,DK,DM,EA,EE,EP,ES,FI,GB,GD,GE,GH,GM,HR,HU,ID,IL,IN,IS,JP,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MA,MD,MG,MK,MN,MW,MX,NO,NZ,OA,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,TZ,UA,UG,UZ,VN,YU,ZA,ZW
The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on 23 November 2000 (23.11.00) under No. WO 00/69275

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a demand for international preliminary examination must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the national phase, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer J. Zahra
Facsimile No. (41-22) 740.14.35	Telephone No. (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

INFORMATION CONCERNING ELECTED
OFFICES NOTIFIED OF THEIR ELECTION

(PCT Rule 61.3)

From the INTERNATIONAL BUREAU

To:

Sagtype	J.no	Ing.
P17	72201	UCK
22 JAN. 2001		
CHAS. HUDE A/S H.C. Andersens Boulevard 33 DK-1553 Copenhagen V DANEMARK		Til hvem SP

Date of mailing (day/month/year) 12 January 2001 (12.01.01)		IMPORTANT INFORMATION	
Applicant's or agent's file reference 72201 UCK/ve			
International application No. PCT/DK00/00252	International filing date (day/month/year) 12 May 2000 (12.05.00)	Priority date (day/month/year) 12 May 1999 (12.05.99)	
Applicant HERCULES INCORPORATED et al			

1. The applicant is hereby informed that the International Bureau has, according to Article 31(7), notified each of the following Offices of its election:

AP : GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW

EP : AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE

National : AU, BG, CA, CN, CZ, DE, IL, JP, KP, KR, MN, NO, NZ, PL, RO, RU, SE, SK, US

2. The following Offices have waived the requirement for the notification of their election; the notification will be sent to them by the International Bureau only upon their request:

EA : AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

OA : BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

National : AE, AG, AL, AM, AT, AZ, BA, BB, BR, BY, CH, CR, CU, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IN, IS, KE, KG, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MW, MX, PT, SD, SG, SI, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW

3. The applicant is reminded that he must enter the "national phase" before the expiration of 30 months from the priority date before each of the Offices listed above. This must be done by paying the national fee(s) and furnishing, if prescribed, a translation of the international application (Article 39(1)(a)), as well as, where applicable, by furnishing a translation of any annexes of the international preliminary examination report (Article 36(3)(b) and Rule 74.1).

Some offices have fixed time limits expiring later than the above-mentioned time limit. For detailed information about the applicable time limits and the acts to be performed upon entry into the national phase before a particular Office, see Volume II of the PCT Applicant's Guide.

The entry into the European regional phase is postponed until 31 months from the priority date for all States designated for the purposes of obtaining a European patent.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Genève 20, Switzerland Facsimile No. (41-22) 740.14.35	Authorized officer: R. E. Stoffel Telephone No. (41-22) 338.83.38
----------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------

The demand must be filed directly with the competent International Preliminary Examining Authority or, if two or more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/ EP

PCT

CHAPTER II

DEMAND

under Article 31 of the Patent Cooperation Treaty:
The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty and hereby elects all eligible States (except where otherwise indicated).

For International Preliminary Examining Authority use only		
Identification of IPEA		Date of receipt of DEMAND
Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION		Applicant's or agent's file reference 72201 UCK/SP
International application No. PCT/DK00/00252	International filing date (day/month/year) 12 May 2000	(Earliest) Priority date (day/month/year) 12 May 1999
Title of invention Food Composition with High Solids Content, A Method for Its Preparation as well as the Use of Carrageenan for Gelling a Food Composition		
Box No. II APPLICANT(S)		
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) Hercules Incorporated Hercules Plaza 1313 North Market Street Wilmington, Delaware 19894 USA		Telephone No.: 001 302 594 6923 Facsimile No.: 001 302 594 6998 Teleprinter No.:
State (that is, country) of nationality: USA		State (that is, country) of residence: USA
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) JØNSSON, Torben 17, Fortunvej DK-2920 Charlottenlund Denmark		
State (that is, country) of nationality: Denmark		State (that is, country) of residence: Denmark
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) KRISTENSEN, Jeanette 38, Gevninge Bygade DK-4000 Roskilde Denmark		
State (that is, country) of nationality: Denmark		State (that is, country) of residence: Denmark
<input checked="" type="checkbox"/> Further applicants are indicated on a continuation sheet.		

Sheet No. 2.

International application No.

PCT/DK00/00252

Continuation of Box No. II APPLICANT(S)

If none of the following sub-boxes is used, this sheet should not be included in the demand.

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

GRØNDAL, Jan
7, Meteorvej
DK-4040 Jyllinge
Denmark

State (that is, country) of nationality:

Denmark

State (that is, country) of residence:

Denmark

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

State (that is, country) of nationality:

State (that is, country) of residence:

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

State (that is, country) of nationality:

State (that is, country) of residence:

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

State (that is, country) of nationality:

State (that is, country) of residence:

☐

Further applicants are indicated on another continuation sheet.

Box No. III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCEThe following person is ☒ agent ☐ common representativeand ☒ has been appointed earlier and represents the applicant(s) also for international preliminary examination.☐ is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.☐ is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.Name and address: (Family name followed by given name; for a legal entity, full official designation.
The address must include postal code and name of country.)CHAS.HUDE A/S
33, H.C. Andersens Boulevard
DK-1780 Copenhagen V
Denmark

Telephone No.:

+45 33154514

Facsimile No.:

+45 33154535

Teleprinter No.:

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.**Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION****Statement concerning amendments:***

1. The applicant wishes the international preliminary examination to start on the basis of:

☒ the international application as originally filed

the description

☐ as originally filed☐ as amended under Article 34

the claims

☐ as originally filed☐ as amended under Article 19 (together with any accompanying statement)☐ as amended under Article 34

the drawings

☐ as originally filed☐ as amended under Article 342. ☐ The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.3. ☐ The applicant wishes the start of the international preliminary examination to be postponed until the expiration of 20 months from the priority date unless the International Preliminary Examining Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69.1(d)). (This check-box may be marked only where the time limit under Article 19 has not yet expired.)

* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination: English

☒ which is the language in which the international application was filed.☐ which is the language of a translation furnished for the purposes of international search.☐ which is the language of publication of the international application.☐ which is the language of the translation (to be) furnished for the purposes of international preliminary examination.**Box No. V ELECTION OF STATES**

The applicant hereby elects all eligible States (that is, all States which have been designated and which are bound by Chapter II of the PCT)

excluding the following States which the applicant wishes not to elect:

Box No. VI CHECK LIST

The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:

- | | | |
|--------------------------------------------------------------------------|---|--------|
| 1. translation of international application | : | sheets |
| 2. amendments under Article 34 | : | sheets |
| 3. copy (or, where required, translation) of amendments under Article 19 | : | sheets |
| 4. copy (or, where required, translation) of statement under Article 19 | : | sheets |
| 5. letter | : | sheets |
| 6. other (specify) | : | sheets |

For International Preliminary Examining Authority use only

received not received

<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

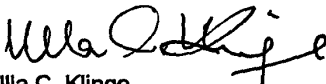
The demand is also accompanied by the item(s) marked below:

- | | |
|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| 1. <input checked="" type="checkbox"/> fee calculation sheet | 4. <input type="checkbox"/> statement explaining lack of signature |
| 2. <input type="checkbox"/> separate signed power of attorney | 5. <input type="checkbox"/> nucleotide and or amino acid sequence listing in computer readable form |
| 3. <input type="checkbox"/> copy of general power of attorney, reference number, if any: | 6. <input checked="" type="checkbox"/> other (specify): International Search Report |

Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).

Chas.Hude A/S


Ulla C. Klinge
Representative of the Applicant

For International Preliminary Examining Authority use only

1. Date of actual receipt of DEMAND:

2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| 3. <input type="checkbox"/> The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply. | <input type="checkbox"/> The applicant has been informed accordingly. |
| 4. <input type="checkbox"/> The date of receipt of the demand is WITHIN the period of 19 months from the priority date as extended by virtue of Rule 80.5. | |
| 5. <input type="checkbox"/> Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82. | |

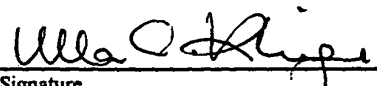
For International Bureau use only

Demand received from IPEA on:

PCT

FEE CALCULATION SHEET

Annex to the Demand for international preliminary examination

International application No. PCT/DK00/00252	For International Preliminary Examining Authority use only									
Applicant's or agent's file reference 72201 UCK/Sp	Date stamp of the IPEA									
Applicant Hercules Incorporated et.al.										
Calculation of prescribed fees										
1. Preliminary examination fee	EUR 1,533.-	<input type="checkbox"/> P								
2. Handling fee <i>(Applicants from certain States are entitled to a reduction of 75% of the handling fee. Where the applicant is (or all applicants are) so entitled, the amount to be entered at H is 25% of the handling fee.)</i>	EUR 147.-	<input type="checkbox"/> H								
3. Total of prescribed fees Add the amounts entered at P and H and enter total in the TOTAL box	EUR 1,680.-									
TOTAL										
Mode of Payment										
<table style="width: 100%;"> <tr> <td><input checked="" type="checkbox"/> authorization to charge deposit account with the IPEA (see below)</td> <td><input type="checkbox"/> cash</td> </tr> <tr> <td><input type="checkbox"/> cheque</td> <td><input type="checkbox"/> revenue stamps</td> </tr> <tr> <td><input type="checkbox"/> postal money order</td> <td><input type="checkbox"/> coupons</td> </tr> <tr> <td><input type="checkbox"/> bank draft</td> <td><input type="checkbox"/> other (specify):</td> </tr> </table>			<input checked="" type="checkbox"/> authorization to charge deposit account with the IPEA (see below)	<input type="checkbox"/> cash	<input type="checkbox"/> cheque	<input type="checkbox"/> revenue stamps	<input type="checkbox"/> postal money order	<input type="checkbox"/> coupons	<input type="checkbox"/> bank draft	<input type="checkbox"/> other (specify):
<input checked="" type="checkbox"/> authorization to charge deposit account with the IPEA (see below)	<input type="checkbox"/> cash									
<input type="checkbox"/> cheque	<input type="checkbox"/> revenue stamps									
<input type="checkbox"/> postal money order	<input type="checkbox"/> coupons									
<input type="checkbox"/> bank draft	<input type="checkbox"/> other (specify):									
Deposit Account Authorization <i>(this mode of payment may not be available at all IPEAs)</i>										
The IPEA/ EP <input checked="" type="checkbox"/> is hereby authorized to charge the total fees indicated above to my deposit account.										
<input checked="" type="checkbox"/> <i>(this check-box may be marked only if the conditions for deposit accounts of the IPEA so permit)</i> is hereby authorized to charge any deficiency or credit any overpayment in the total fees indicated above to my deposit account.										
28030014 Deposit Account Number	23 November 2000 Date (day/month/year)	 Signature								

PATENT COOPERATION TREATY

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

Chas. Hude A/S
33, H. C. Andersens Boulevard
DK-1780 Copenhagen V
DANEMARK

PCT

WRITTEN OPINION

(PCT Rule 66)

Sagstype <i>PA</i>	J.nr. <i>72201</i>	Ing. <i>UKK</i>
- 7 FEB. 2001		
AS 400 <i>WFO</i>	Til hvem <i>UKK</i>	Date of mailing (day/month/year) <i>UKK</i>

05.02.2001

Applicant's or agent's file reference

72201 UCK/sp

REPLY DUE

within 3 month(s)
from the above date of mailing

International application No.

PCT/DK00/00252

International filing date (day/month/year)

12/05/2000

Priority date (day/month/year)

12/05/1999

International Patent Classification (IPC) or both national classification and IPC

A23G1/00

Applicant

HERCULES INCORPORATED et al.

1. This written opinion is the first drawn up by this International Preliminary Examining Authority.

2. This opinion contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain document cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

3. The applicant is hereby invited to reply to this opinion.

When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).


How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also: For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 12/09/2001.

Name and mailing address of the international preliminary examining authority:

 European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized officer / Examiner

Graham, J

Formalities officer (Incl. extension of time limits)

Baillou, V

Telephone No. +49 89 2399 8236



WRITTEN OPINION

International application No. PCT/DK00/00252

I. Basis of the opinion

1. This opinion has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed".*):

Description, pages:

1-40 as originally filed

Claims, No.:

1-26 as originally filed

Drawings, sheets:

1/10-10/10 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

WRITTEN OPINION

International application No. PCT/DK00/00252

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N) Claims 1-26

Inventive step (IS) Claims

Industrial applicability (IA) Claims

2. Citations and explanations
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

**WRITTEN OPINION
SEPARATE SHEET**

International application No. PCT/DK00/00252

Reference is made to the following documents:

D1: US 5 607 716 A (CHERYL A. DOHERTY ET AL) 4 March 1997

D2: WO 98 20860 A2 (FMC CORPORATION) 22 May 1998

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1.1 Independent claim 1 describes a composition comprising 50 - 90% soluble solids by weight, of which at least 70% comprise of sweeteners in a weight ratio of 0:100 to 95:5 of sucrose to non sucrose sweeteners (DE value ≥ 30) with a sufficient amount of carrageenan to form a gel, water and a gelation temperature below 95°C.

Example 1 in D1 discloses a caramel composition comprising 53% soluble solids of which 84% are high fructose corn syrup solids, no sucrose, 0.45% carrageenan and water. The gelation temperature is a consequence of the composition, thus a value below 95°C would be obtained. The results given in example 9 of the application (based on examples 6 and 8 in D1) have no bearing on example 1 since the additional ingredients used in example 9 have a significant effect on the gelling characteristics of the product. *✓ Regular caramel*

Furthermore, example 1 in D2 discloses a composition with 79.5% soluble solids (p. 7, line 8), of which 84%¹ comprise of sucrose and corn syrup in a weight ratio of 45:55² of sucrose to corn syrup with a DE value of 42/43 (p. 6, line 30) and carrageenan (p. 6, lines 24 - 26) to form a gelled product (p. 7, line 13). *1:1.22*

The subject-matter of claim 1 is therefore not novel (Article 33(2) PCT).

¹ % of soluble solids comprising of sucrose and corn syrup

$$= 100 * ((409.60 * 0.8) + 255.70 + 11.3) / ((409.60 * 0.8) + 255.70 + 11.1 + 11.3 + 100)$$

² weight ratio of sucrose to corn syrup

$$= (255.70 + 11.3) : 409.60 * 0.8$$

1.2 Independent claim 20 describes a process for producing a food composition according to claim 1 whereby the carrageenan is dispersed in a syrup of a non sucrose sweetener, the water is added and the mixture heated to boiling point, the soluble solids are adjusted to 50 - 90% and the mix is deposited and cooled to a temperature lower than the depositing temperature.

D1 discloses a process (col. 6, line 5 - 12) for producing a food composition according to claim 1 whereby the carrageenan is blended into the hot corn syrup, the other ingredients are added and the resulting mixture is cooked to adjust the solids content i.e. boiled and cast into molds and allowed to cool and set. The subject-matter of claim 20 is therefore not novel (Article 33(2) PCT).

1.3 Independent claim 25 describes the use of carrageenan for gelling a food composition comprising of 50 - 90% soluble solids by weight, of which at least 70% comprise of sweeteners in a weight ratio of 0:100 to 95:5 of sucrose to non sucrose sweeteners (DE value ≥ 30) and a gelation temperature below 95°C.

Example 1 in D2 discloses the use of carrageenan (p. 6, lines 24 - 26) to form a gelled product (p. 7, line 13) comprising of 79.5% soluble solids (p. 7, line 8), of which 84%¹ comprise of sucrose and corn syrup in a weight ratio of 45:55² of sucrose to corn syrup with a DE value of 42/43 (p. 6, line 30). The gelation temperature is a consequence of the composition, thus a value below 95°C would be obtained. The subject-matter of claim 25 is therefore not novel (Article 33(2) PCT).

1.4 With regard to the dependent claims, it is noted that a positive opinion can only be given if they refer to independent claims that meet the requirements of the PCT.

Re Item VIII

Certain observations on the international application

1.1 The interpretation of gelation temperature in claim 1 has not been limited to that defined in the description (p. 7, line 12 - 13) since it is not included in the claim. Furthermore, the measurement method on page 30 is insufficiently disclosed e.g. spindle used is not specified (Article 5 PCT).

**WRITTEN OPINION
SEPARATE SHEET**

International application No. PCT/DK00/00252

1.2 Dependent claim 6 states that the sucrose and / or non-sucrose sweeteners can be replaced wholly or partly by an aqueous solution of a sugar alcohol. Claim 1 states that at least 70% of the soluble solids comprise of the sweeteners sucrose and non sucrose sweeteners with a DE value above 30. Thus, claim 6 does not comprise of all the features of claim 1 to which it refers to and is therefore not appropriately formulated as a claim dependent on the latter (Rule 6.4 PCT).

In order to facilitate the examination of the conformity of the amended application with the requirements of Article 34(2)(b) PCT, the applicant is requested to clearly identify the amendments carried out, no matter whether they concern amendments by addition, replacement or deletion, and to indicate the passages of the application as filed on which these amendments are based (see also Rule 66.8(a) PCT).

If the applicant regards it as appropriate these indications could be submitted in handwritten form on a copy of the relevant parts of the application as filed.